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United States
Department of
Agriculture

Soil
Conservation
Service

Spokane,
Washington



in cooperation with

Department of Ecology
State of Washington

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Water Supply Outlook for Washington

as of APRIL 1, 1981 . . .



TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

COVER PHOTO: SNOW SURVEYORS MAKING SPECIAL MEASUREMENTS OF THE
SNOWPACK NEAR MT. ST. HELENS VOLCANO, WASHINGTON, APRIL, 1980.

PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, West Technical Service Center, Room 510, 511 N.W. Broadway, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	Room 129, 2221 East Northern Lights Blvd., Anchorage, Alaska 99504
Arizona	Room 3008, Federal Building, 230 N. First Ave., Phoenix, Arizona 85025
Colorado (N. Mex.)	P. O. Box 17107, Denver, Colorado 80217
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno, Nevada 89505
Oregon	1220 S. W. Third Ave., Portland, Oregon 97204
Utah	4420 Federal Bldg., 125 South State St., Salt Lake City, Utah 84138
Washington	360 U. S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82602

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Snow Surveys Branch, California Department of Water Resources, P.O. Box 388, Sacramento, California 95802 --- for British Columbia by the Ministry of the Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia V8V 1X5 --- for Yukon Territory by the Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory Y1A 3V1 --- and for Alberta, Saskatchewan, and N.W.T. by the Water Survey of Canada, Inland Waters Branch, 110-12 Avenue S.W., Calgary, Alberta T3C 1A6.



WATER SUPPLY OUTLOOK FOR WASHINGTON

and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

Issued by

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THE UNIVERSITY OF CHICAGO

PHILOSOPHY DEPARTMENT

PHILOSOPHY 101

LECTURE NOTES

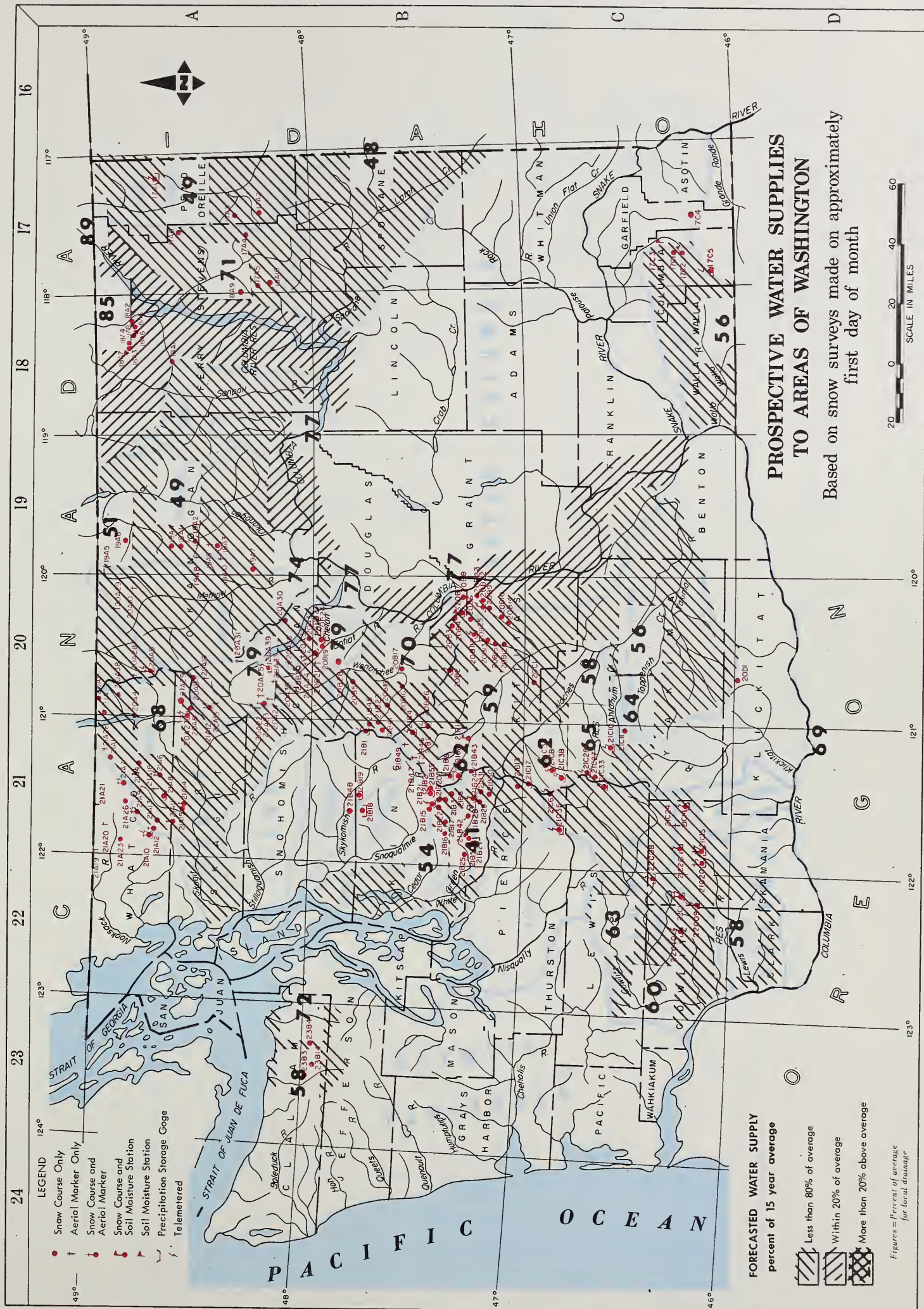
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SPRING 2024

LECTURE 1

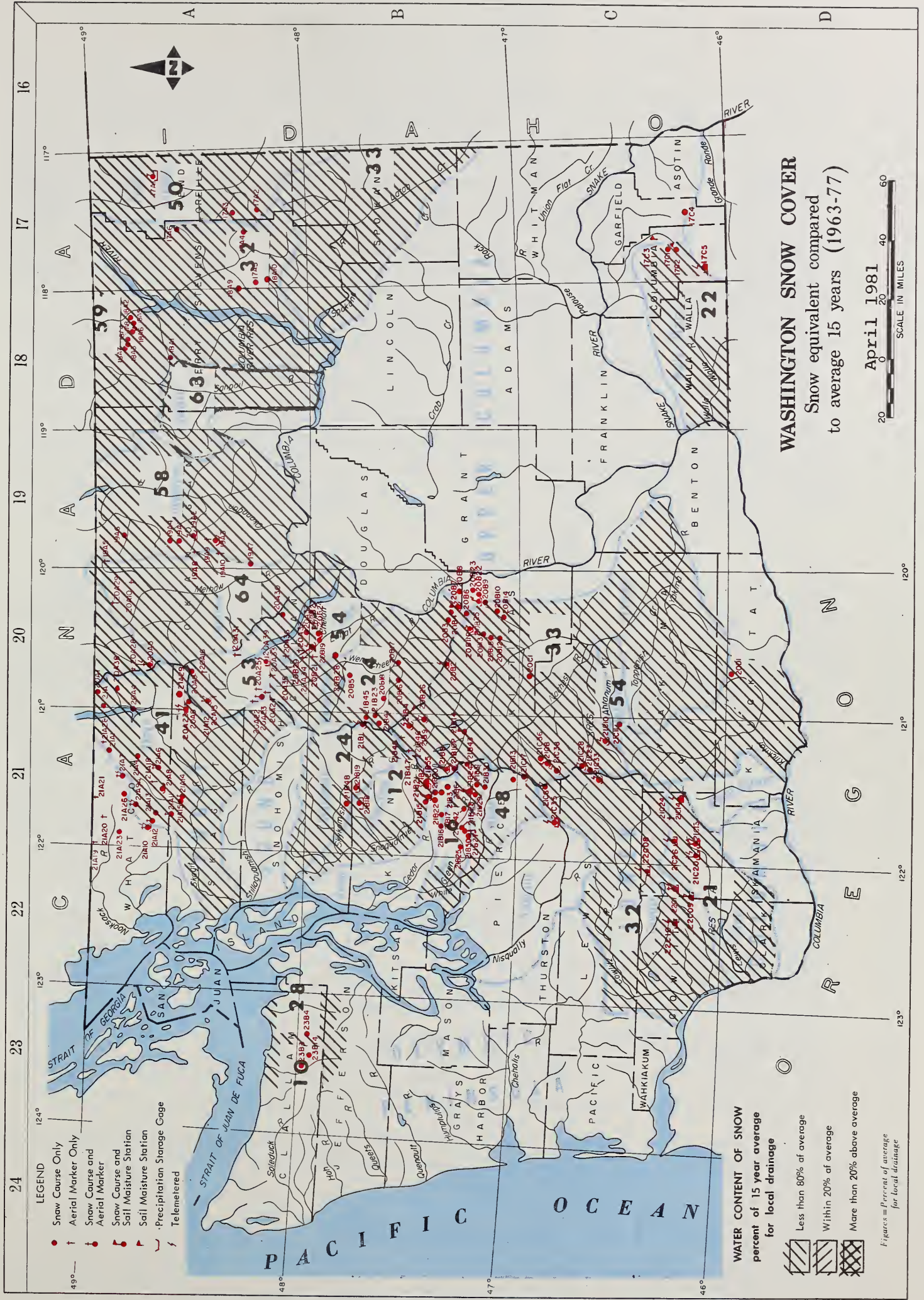
THE PHILOSOPHY OF

SCIENCE



INDEX to WASHINGTON SNOW COURSES, SOIL MOISTURE STATIONS and PRECIPITATION STORAGE GAGES

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.	NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.	NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.				
UPPER COLUMBIA DRAINAGE																					
Pend Oreille River																					
Boyer Mountain	17A2	7	31N	43E	5250	Colacolum Creek						Lewis River									
Bunchgrass Meadow	1-A15P	24	37N	44E	5000	Colacolum Creek Upper	20B22	11	20N	20E	5300	Lone Pine Shelter	21C26SP	8	9N	7E	3800				
Winchester Creek	17A3	30	33N	43E	2970	Colacolum Creek Lower	20B23	1	20N	20E	4300	Maple Mountain	22C09SP	26	8N	5E	3200				
Kettle River																					
Boulder Road	18A2	36	39N	36E	1450	Squitchuck Creek						Cowlitz River									
Butte Creek	18A3	28	39N	35E	4070	Beehive Springs	20B3	12	21N	19E	4400	Plains of Abrahm	22C13P	35	9N	5E	4400				
Cabin Creek	18A8	5	38N	36E	3170	Scout-A-Vista	20B4	18	21N	20E	2400	Spencer Meadow	21C20SP	16	8N	7E	3400				
Groat Creek	18A4	26	39N	35E	3595	Stemilt Creek						Surprise Lakes	21C13SP	14	7N	8E	4250				
Snow Caps Creek	18A5	3	38N	36E	2150	Jump-Off	20B8	34	21N	20E	4450	Freezeout Creek Trail	20A1	14	40N	14E	3500				
Snow Caps Trail	18A6	5	38N	36E	2720	Stemilt Slide	20B7SP	30	21N	20E	4400	Granite Creek	20A38	8	40N	16E	5000				
Summit G. S.	18A7	20	39N	35E	4600	Upper Wheeler	20B7SP	30	21N	20E	4400	Freezeout Meadows (New)	21A29	25	36N	16E	3500				
Colville River																					
Baird	17A6	19	36N	42E	3215	Yakima River						Meadows Cobins	20A7	19	40N	14E	1900				
Carlson	18A9	34	32N	38E	2885	Ahtonom R. S.	21C11	24	12N	14E	3100	New Hozomeen Lake	21A30	10	35N	14E	4200				
Chewelah	17A4	11	32N	41E	4925	Big Boulder Creek	21B9SP	35	23N	14E	3200	Baker River									
Stranger Mountain	17A5	26	31N	38E	4990	Bumping Lake	21C8P	23	16N	12E	3450	Dock Butte	21A11A	8	36N	8E	3800				
Togo	18A10	6	29N	38E	3370	Bumping Lake New	21C36	13	16N	12E	3400	Easy Pass	21A7A	19	39N	11E	5200				
Sanpoil River																					
Sherman Creek Pass	18A1	19	36N	35E	5350	Bumping Ridge	21C38SP	9	15N	12E	4600	Jasper Pass	21A6A	17	38N	11E	5400				
Okanogan River																					
Clark	19A8a	2	36N	23E	7000	Colacolum Pass	20B9	25	20N	20E	5370	Marten Lake	21A9A	23	38N	8E	3600				
Muckamuck	19A9a	20	36N	24E	6750	Cooke Creek	20B10	17	19N	20E	4123	Mount Blum	21A18a	27	38N	10E	5800				
Mutton Creek No. 1	19A1	30	37N	24E	5700	Fish Lake	21B45P	28	24N	14E	3371	Rocky Creek	21A12AP	20	37N	8E	3400				
Mutton Creek No. 2	19A4	19	37N	24E	6000	Green Lake	21C10SP	3	12N	13E	6000	Schreibers Meadow	21A10AF	18	37N	8E	3400				
Paydayten	20A28a	32	40N	18E	4300	Grouse Camp	20B11 SP	39	21N	19E	5385	S. F. Thunder Creek	21A14A	20	36N	9E	2200				
Rusty Creek	19A3P	18	35N	24E	4000	High Creek	20B12	22	23N	12E	4624	Sulphur Creek	21A13	22	37N	8E	1600				
Salmon Meadows	19A25P	33	37N	24E	4500	Joe Lake	21B46a	15	20N	14E	2200	Three Mile Creek	21A15	18	36N	9E	1600				
Starvation Min.	19A10a	15	35N	23E	6750	Lake Cle Elum	21B14M	15	20N	14E	2200	Watson Lakes	21A8P	25	37N	9E	4500				
Touts Coulee	19A6	30	39N	25E	2845	Lemah Creek	21B47a	7	23N	13E	3327	Nooksack River									
Methow River																					
Billy Goat Pass	20A10a	10	38N	20E	6400	Manastash	20C1	24	17N	16E	3935	Bald Mountain	21A19a	7	40N	7E	4400				
Dollar Watch	20A29a	8	39N	20E	7000	Morse Lake	21C17 SP	6	16N	11E	5400	Canyon	21A20A	20	40N	8E	5100				
Harts Pass	20A55P	7	37N	18E	6500	Nanum	20B13	4	20N	19E	3875	Glacier Creek	21A23	9-10	38N	7E	3700				
Horseshoe Basin	19A5a	15	40N	23E	7000	Trail Creek	20B14	20	19N	20E	3360	Panorama New	21A26	17	39N	9E	4300				
Loup Loop	19A7	36	34N	23E	4650	Tunnel Avenue	21B8P	13	21N	11E	2450	Twin Lakes	21A21a	16	40N	9E	5200				
Chelan Lake Basin																					
Cloudy Pass	20A22a	12	31N	15E	6500	Van Epps Pass	20B26a	16	23N	15E	5925	OLYMPIC PENINSULA									
Greenwood Flat	20A25a	3	31N	16E	3540	Wapitus Lake	20B15	22	20N	19E	3360	Dungeness River									
Little Meadows	20A24a	8	31N	16E	5275	White Pass (East Side)	21B49a	12	23N	13E	3024	Deer Park	23B4	1	28N	5W	5200				
Lynan Lake	20A23P	18	31N	16E	5900	LOWER COLUMBIA DRAINAGE												Morse Creek			
Park Creek Flat	20A13a	19	34N	16E	2220	Asotin Creek						Cedar River									
Park Creek Ridge	20A12SP	18	34N	16E	4600	17C4	9	8N	40E	5700	City Cabin	21B3	10	21N	10E	2390					
Petersons	20A16a	3	34N	17E	3730	Spruce Springs	17C4	9	8N	40E	5700	Mt. Gardner	21B21P	30	22N	10E	3300				
Rainy Pass	20A95P	21	35N	17E	4780	Asotin Creek						Mt. Gardner Aux.	21B22	31	22N	10E	2500				
Safety Harbor	20A30a	32	31N	20E	6300	Asotin Creek						Mt. Lindsay	21B16P	31	22N	9E	2500				
War Creek Pass	20A31a	34	33N	18E	6500	Asotin Creek						Mt. Washington	21B15P	8	22N	9E	3000				
Minor Lake	20A39	30	31N	18E	5600	Asotin Creek						Rex River	21B17P	11	21N	9E	2400				
Entiat River																		South Fork Cedar			
Blue Creek G. S.	20B28a	19	28N	18E	5425	Asotin Creek						Touchet River	21B6P	24	21N	10E	3000				
Brief	20B19	34	28N	19E	1600	Asotin Creek						Touchet River	21B20P	1	21N	10E	3400				
Entiat Meadows	20A33a	28	31N	17E	4540	Asotin Creek						Snoqualmie River									
Entiat River Trail	20A34a	2	29N	17E	3325	Asotin Creek						Alpine Meadow	21B48	31	27N	9E	3500				
Four Mile Ridge	20B27a	15	28N	19E	6800	Asotin Creek						Olallie Meadows	21B2P	19	22N	11E	3625				
Fox Camp	20A36a	17	30N	18E	6510	Asotin Creek						South Fork Tolt	21B18P	26	22N	9E	1900				
Pope Ridge	20B20	22	29N	18E	3540	Asotin Creek						Olallie Meadows East	21B55SP	20	22N	11E	8700				
Pope Ridge Snow Pillow	20B24SP	22	29N	18E	3540	Asotin Creek						Skykomish River									
Pugh Ridge	20A32a	34	30N	18E	6725	Asotin Creek						Lake Elizabeth	21B19P	33	26N	10E	2900				
Shady Pass	20A37	20	29N	19E	6200	Asotin Creek						Snoqualmie River									
Snow Brushy	20A34a	21	30N	17E	3910	Asotin Creek						Snoqualmie River									
Tommy Creek	20B21a	10	28N	18E	4900	Asotin Creek						Snoqualmie River									
Wenatchee River																					
Berne-Mill Creek	21B23	7	26N	15E	3170	Asotin Creek						Snoqualmie River									
Berne-Mill Creek (New)	21B41SP	13	26N	14E	3240	Asotin Creek						Snoqualmie River									
Blaweth Pass No. 2	20B2SP	35	22N	17E	4270	Asotin Creek						Snoqualmie River									
Chiwaukum G. S.	20B1C	4	25N	17E	1810	Asotin Creek						Snoqualmie River									
Lake erriechee	20B5	33	27N	17E	1970	Asotin Creek						Snoqualmie River									
Leavenworth R. S.	20B17	1	24N	17E	1127	Asotin Creek						Snoqualmie River									
Merritt	20B18	14	26N	16E	2140	Asotin Creek						Snoqualmie River									
Stevens Pass	21B15P	14	26N	13E	4070	Asotin Creek						Snoqualmie River									
Stevens Pass Sand Shed	21B45	12	26N	19E	3700	Asotin Creek						Snoqualmie River									
Stevens Pass	20B25SP	10	20N	20E	5310	Asotin Creek						Snoqualmie River									



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NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.	NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.
UPPER COLUMBIA DRAINAGE											
Pend Oreille River											
Boyer Mountain	17A2	7	31N	43E	5250	Colockum Creek					
Bunchgrass Meadow	1A1SP	24	37N	44E	5000	Colockum Creek Upper	20B22	11	20N	20E	5300
Winchester Creek	17A3	30	33N	43E	2970	Colockum Creek Lower	20B23	1	20N	20E	4300
Kettle River											
Boulder Road	18A2	36	39N	36E	1450	Squilehuck Creek					
Butte Creek	18A3	28	39N	35E	1070	Beehive Springs	20B3	12	21N	19E	4400
Gabin Creek	18A8	31	38N	36E	3170	Scout-A-Visto	20B4	18	21N	20E	3400
Goot Creek	18A4	26	39N	35E	3595	Stemilt Creek					
Snow Caps Creek	18A5	3	38N	36E	2150	Jump-Off	20B8	34	21N	20E	4450
Snow Caps Trail	18A6	5	38N	36E	2720	Stemilt Slide	20B6	30	21N	20E	5000
Summit G. S.	18A7	20	39N	35E	4600	Upper Wheeler	20B7SP	30	21N	20E	4400
Colville River											
Barid	17A6	19	36N	42E	3215	Yakima River					
Carlson	18A9	34	32N	38E	2885	Althum R. S.	21C11	24	12N	14E	3100
Chevelah	17A4	11	32N	41E	4925	Big Boulder Creek	21B9SP	35	23N	14E	3200
Stranger Mountain	17A5	26	31N	38E	4990	Bumping Lake	21C8P	23	16N	12E	3450
Togo	18A10	6	29N	38E	3370	Bumping Lake New	21C36	13	15N	12E	3400
Sanpoil River											
Sherman Creek Pass	18A1	19	36N	35E	5350	Bumping Ridge	21C38SP	9	16N	12E	4600
Okanogan River											
Clark	19A8	2	36N	23E	7000	Colockum Pass	20B9	25	20N	20E	5370
Mucknuck	19A9	30	37N	24E	6750	Cooke Creek	20B10	17	19N	20E	4123
Mutton Creek No. 1	19A1	30	37N	24E	6000	Fish Lake	21B4SP	28	24N	14E	3371
Mutton Creek No. 2	19A4	19	37N	24E	5700	Green Lake	21C10SP	3	12N	13E	6000
Paysayten	20A28a	32	40N	18E	4300	Grouse Camp	20B11SP	29	21N	19E	5385
Rusty Creek	19A3P	18	35N	24E	4000	High Creek	20B12	34	20N	19E	2930
Salmon Meadows	19A2SP	33	37N	24E	4500	Lake Cle Elum	21B46	22	23N	12E	4624
Starvation Mtn.	19A10a	15	35N	23E	6750	Lemah Creek	21B47a	7	23N	13E	3327
Touts Coulee	19A6	30	39N	25E	2845	Monastash	20C1	24	17N	16E	3935
Methow River											
Billy Goat Pass	20A10a	10	38N	20E	6400	Morse Lake	21C17SP	6	16N	11E	5400
Dollar Watch	20A29a	8	39N	20E	7000	Nanum	20B13	4	20N	19E	3875
Harts Pass	20A5SP	7	37N	18E	6500	Trail Creek	20B14	20	19N	20E	3360
Horseshoe Basin	19A5a	15	40N	23E	7000	Tunnel Avenue	21B8P	16	23N	11E	2450
Loup Loup	19A7	36	34N	23E	4650	Van Epps Pass	20B26a	13	23N	15E	5925
Chelan Lake Basin											
Cloudy Pass	20A22a	12	31N	15E	6500	Walkers Flat	20B15	22	20N	19E	3360
Greenwood Flat	20A25a	3	31N	16E	3540	Waprus Lake	21B49a	12	23N	13E	3024
Little Meadows	20A24a	8	31N	16E	5275	White Pass (East Side)	21C28SP	2	13N	11E	4500
Lyman Lake	20A23SP	18	31N	16E	5900	LOWER COLUMBIA DRAINAGE					
Park Creek Flat	20A13a	19	34N	16E	2220	Asotin Creek					
Park Creek Ridge	20A12SP	18	34N	16E	4600	Spruce Springs					
Petersons	20A16a	3	34N	17E	3730	17C4	9	8N	40E	5700	
Rainy Pass	20A9SP	21	35N	17E	4780	Touchet River					
Safety Harbor	20A30a	32	31N	20E	6300	Cause	17C3m	2	9N	40E	3370
War Creek Pass	20A31a	34	33N	18E	6500	Homestead	17C1	11	9N	40E	4030
Mirror Lake	20A39	30	31N	18E	5600	Martin Springs (Helmers SM)	17C2M	23	9N	40E	4400
Entiat River											
Blue Creek G.S.	20B28a	19	28N	18E	5425	Touchet No. 2	17C5SP	6	7N	40E	5530
Brief	20B19	34	28N	19E	1600	Klickitat River					
Entiat Meadows	20A33a	28	31N	17E	4540	2001	21	6N	17E	4030	
Entiat River Trail	20A34a	2	29N	17E	3325	Satus Pass					
Four Mile Ridge	20B27a	15	28N	19E	6800	Snoqualmie River					
Fox Camp	20A36a	17	30N	18E	6510	21B3	10	21N	10E	2390	
Pope Ridge	20B20	22	29N	18E	3540	21B21P	30	22N	10E	3300	
Pope Ridge Snow Pillow	20B24SP	22	29N	18E	3540	21B22	31	22N	10E	2500	
Pugh Ridge	20A32a	34	30N	18E	6725	21B16P	31	22N	9E	2500	
Shady Pass	20A37	20	29N	19E	6200	21B15P	8	22N	9E	3000	
Snow Brushy	20A35a	21	30N	17E	3910	21B17P	11	21N	9E	2400	
Tommy Creek	20B21a	10	28N	18E	4900	21B6P	24	21N	10E	3000	
Wenatchee River											
Berne-Mill Creek	21B23	7	26N	15E	3170	21B20P	1	21N	10E	3400	
Berne-Mill Creek (New)	21B41SP	13	26N	14E	3240	Skykomish River					
Blewett Pass No. 2	20B2SP	35	22N	17E	4270	21B48	31	27N	9E	3500	
Chiwaukum G. S.	20B16	4	23N	17E	1810	21B2P	19	22N	11E	3625	
Lake Entiatlee	20B5	33	27N	17E	1970	21B18P	26	26N	9E	1900	
Leavenworth R. S.	20B17	1	24N	17E	1127	Ollalie Meadows East	21B55SP	20	22N	11E	8700
Merritt	20B18	4	26N	16E	2140	LEGEND					
Stevens Pass	21B15P	14	26N	13E	4070	21A7	Snow Course Only				
Stevens Pass Sand Shed	21B45	12	26N	19E	3700	21A7a	Snow Course And Aerial Marker				
Trough	20B25SP	10	20N	20E	5310	21A7b	Snow Course And Precipitation Station				
						21A7P	Snow Course And Precipitation Storage Gage				
						21A7SP	Snow Pillow				

WATER SUPPLY OUTLOOK

State of Washington

April 1, 1981

The storms of the last of March and the first of April were a welcome change from the extremely dry, warm weather that the state has experienced; but it was too little and too late. True, a lot of moisture was put down in the high country and it was put down after the snow surveys were made; but the measurements that were made before and after indicate that the state of Washington is still going to be hurting for water come late summer and early fall. Forecasts made as of April 1, have been further reduced from those issued on March 1. In some areas, this reduction is minimal-1 or 2 percent; but in others, such as the Okanogan, this reduction has been as much as 20 percent. Rainfall this past month was above normal only in southeastern Washington and the Okanogan. All other drainage divisions reported subnormal precipitation. Where we keep expecting the snowpack to improve up through April 1 each year, 1981 did not come up to expectations. We maxed out on March 1 and have been going down hill every since.

SNOW COVER

The April 1 snowpack is pretty poor. The Upper Columbia Basin has a snowpack that ranges from a low of 24 percent of normal to a high of 64 percent. In 1977, the range was only from 29 to 54 percent. Several of our tributary basins have less snow this year than they had back in 1977. The major difference is that the soil and the weather was bone dry in 1977 where this year we have a wet soil mantle and a wet snowpack. The Lower Columbia snowpacks are all worse than was measured in 1977. Mill Creek was 34 percent less than it was in 1977; the Lewis, 27 percent less; and the Cowlitz, 7 percent less. The Puget Sound Drainage is somewhat of a mixed bag; but most tributary basins report less snow in 1981 than was measured in 1977. The Cedar River is one of these anomalies. In 1977, the snowpack on the Cedar River, as of April 1, was 56 percent of normal. This year, when the surveyors went snow surveying on the 27th of March, they drove to all of the snow courses and all of them were bare. Undoubtedly, snow has occurred since the measurements were made; but not enough to overcome this deficit. Only the White River Drainage has a better snowpack now than was measured in 1977. On the Olympic Peninsula, the snowpack is 10 and 28 percent of normal now compared to 54 and 52 percent for 1977 at this same time. An individual breakdown can be found on page 8 of this report.

RESERVOIRS

Back in December of last year, we had some excellent rainfalls; and these, in turn, washed out a lot of the snow that was on the ground. Through proper management techniques, water managers throughout the basin and state caught a lot of this water in our reservoirs. The result is that we are going into the spring water use season with reservoirs that are nearly full or already full and it is anticipated that all reservoirs will fill with the spring runoff. For example, the Yakima with a capacity of 1,066,000 acre feet has 908,700 acre feet in storage for a total of 85 percent of capacity. This current storage as compared to average storage is 23 percent above. The other lakes and reservoirs in the state have a similar situation with well above average amounts of water in storage.

PRECIPITATION

As reported by the National Weather Service, rainfall during the month of March was generally deficient over the state and tributary basins. The November through March winter precipitation story is close to average with five divisions reporting subnormal amounts and four above average. In Canada, the Columbia Above Castlegar had rainfall only 64 percent of average and when added to the previous month's precipitation, now stands at 93 percent of normal for the November through March period. The Pend Oreille-Spokane Drainage had only 57 percent of normal precipitation during the month for a winter accumulation of 86 percent. The east slopes of the Cascades were very dry this past month - only 36 percent of normal precipitation occurred; yet, still, the winter story for this drainage division is 7 percent above average. Percentagewise, the best drainage division is the Okanogan, it being 10 percent greater than average.

STREAMFLOW

A mixed bag has also occurred with the streamflow during the month of March. The range of outflows is from 40 percent of normal for the Palouse River, as measured near Hooper, to a high of 109 percent above average for the Kettle River at Laurier. Excellent flows continue to occur on the mainstem from British Columbia with the Columbia having an outflow, as measured at Birchbank, of 39 percent above normal down to The Dalles with an outflow that is 10 percent below average. This low number is probably the result of low flows from the Snake. Our forecasts of streamflow now range from a high of near 90 percent of normal on the mainstem of the Columbia at Birchbank to a low of 49 percent of normal for the Okanogan Drainage, as measured near Tonasket. A few of the key drainages in the state indicate subnormal flows are expected. For example, in the Yakima system, the forecast for the Yakima River near Parker is for a flow only 56 percent of normal for the April-September period. On the Puget Sound Drainage, we expect the Green River, as measured below Howard Hanson Dam, to flow only 41 percent of average and the Cedar River, 54 percent. As previously stated, the outflow from Canada through the Okanogan system is expected to be only 49 percent of normal, or 850,000 acre feet. Individual forecasts can be found following this narrative.

STREAMFLOW FORECASTS - APRIL, 1981

The following summarized runoff forecasts are based principally on mountain snow-cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts. These forecasts are made as a product of the cooperative efforts of the Soil Conservation Service and the National Weather Service. Streamflow figures for 1980 are preliminary and subject to revision.

Basin, Stream and Station	Forecast Runoff 1981	Seasonal Streamflow in Thousands of Acre-Feet					
		% 15-yr. Avg.	Fore- cast period	1980	1979	1978	15-yr. Average 63-77
<u>COLUMBIA BASIN</u>							
<u>COLUMBIA RIVER SYSTEM</u>							
Columbia River	40400	89	Apr-Sept	40816	34484	44008	45502
at Birchbank <u>1/</u>	32300	89	Apr-July	34085	27181	34030	36353
	23300	89	Apr-June	27623	19661	24082	26194
Columbia River	52300	77	Apr-Sept	61016	52769	66868	68012
at Grand Coulee <u>1/</u>	43300	76	Apr-July	52320	44096	54559	57035
	33600	76	Apr-June	43871	35138	41585	44273
Columbia River	56700	77	Apr-Sept	66512	55298	72892	73935
bl. Rock Island Dam <u>1/</u>	47300	76	Apr-July	57767	46700	60163	62462
	36800	76	Apr-June	48667	37453	46242	48489
Columbia River	71000	69	Apr-Sept	93170	76843	101055	103493
at The Dalles, OR <u>1/</u>	59800	68	Apr-July	79931	65758	84815	88519
	48400	68	Apr-June	68316	55016	67353	71237
<u>PEND OREILLE RIVER SYSTEM</u>							
Pend Oreille River	7800	49	Apr-Sept	13271	11638	15581	15950
bl. Box Canyon	7200	49	Apr-July	12116	11095	14080	14690
	5800	49	Apr-June	10776	10217	11750	11760
<u>KETTLE RIVER SYSTEM</u>							
Kettle River	1560	85	Apr-Sept	1835	1259	2056	1846
nr. Laurier	1500	86	Apr-July	1747	1216	1877	1754
	1380	87	Apr-June	1603	1132	1686	1588
Colville River	95	71	Apr-Sept	116	63	138	134
at Kettle Falls	85	69	Apr-July	105	58	125	123
	80	70	Apr-June	97	55	117	115

1/ Observed flow corrected for storage in any of the following reservoirs which are above the station: Kootenay Lake, Hungry Horse, Flathead Lake, Pend Oreille Lake, F. D. Roosevelt Lake, Lake Chelan, Coeur d'Alene Lake, Brownlee, Noxon Reservoir and pumpage at F. D. Roosevelt Lake.

Basin, Stream and Station	Forecast Runoff 1981	Seasonal Streamflow in Thousands of Acre-Feet					
		% 15-yr. Avg.	Fore- cast period	1980	1979	1978	15-yr. Average 63-77
<u>SPOKANE RIVER SYSTEM</u> **							
Spokane River	1400	48	Apr-Sept	2214	2809	2427	2910
at Post Falls, ID <u>2/</u>	1300	48	Apr-July	2046	2757	2330	2733
	1200	46	Apr-June	1904	2678	2119	2600
<u>OKANOGAN RIVER SYSTEM</u>							
Similkameen River	780	51	Apr-Sept	1479	872	1505	1517
nr. Nighthawk	740	52	Apr-July	1391	812	1365	1417
	630	53	Apr-June	1247	728	1170	1192
Okanogan River	850	49	Apr-Sept	1551	909	1690	1719
nr. Tonasket	780	50	Apr-July	1423	825	1500	1565
	670	51	Apr-June	1240	730	1286	1305
<u>METHOW RIVER SYSTEM</u>							
Methow River	744	74	Apr-Sept	996	478	1174	1011
nr. Pateros	700	75	Apr-July	934	432	1058	937
	600	76	Apr-June	811	382	876	791
<u>CHELAN RIVER SYSTEM</u>							
Chelan River	950	77	Apr-Sept	1120	753	1335	1237
at Chelan <u>3/</u>	850	79	Apr-July	1020	662	1164	1080
	650	78	Apr-June	859	553	906	834
Stehekin River	700	79	Apr-Sept		566	888	883
at Stehekin	600	81	Apr-July		477	750	744
	450	81	Apr-June		387	563	557
Entiat	190	79	Apr-Sept	216	134	295	241
nr. Ardenvoir	175	80	Apr-July	200	120	268	218
	140	80	Apr-June	172	104	275	174
<u>WENATCHEE RIVER SYSTEM</u>							
Wenatchee River	910	70	Apr-Sept		893	1311	1297
at Plain	820	71	Apr-July		812	1171	1156
	650	72	Apr-June		704	945	903
Wenatchee River	1290	73	Apr-Sept	1516	1165	1755	1767
at Peshastin	1140	72	Apr-July	1399	1074	1576	1587
	910	73	Apr-June	1208	938	1275	1250
Stemilt Basin	100*	72	May-Sept				138*
nr. Wenatchee							
Icicle Creek	220	60	Apr-Sept				371
nr. Leavenworth	210	62	Apr-July				342
	175	63	Apr-June				279

* Thousands of Miners' Inches.

** Forecasts made by Jack A. Wilson, Soil Conservation Service, Boise, Idaho.

2/ Observed flow corrected for storage in Coeur d'Alene Lake and diversions by Spokane Valley Farms Company and Rathdrum Prairie Canals.

3/ Observed flow corrected for storage in Lake Chelan.

Basin, Stream and Station	Forecast Runoff 1981	Seasonal Streamflow in Thousands of Acre-Feet					
		% 15-yr. Avg.	Fore- cast period	1980	1979	1978	15-yr. Average 63-77
YAKIMA RIVER SYSTEM							
Yakima River	90	62	Apr-Sept	115	124	114	145
nr. Martin <u>4/</u>	80	60	Apr-July	103	114	101	133
	70	61	Apr-June	95	101	93	114
Yakima River	575	59	Apr-Sept	792	714	808	975
at Cle Elum <u>5/</u>	515	58	Apr-July	716	683	696	883
	450	60	Apr-June	646	599	614	751
Yakima River	1210	56	Apr-Sept	1833	1388	1977	2168
nr. Parker <u>6/</u>	1050	54	Apr-July	1733	1287	1691	1954
	1000	59	Apr-June	1610	1179	1487	1693
Kachess River	70	56	Apr-Sept	111	101	98	126
nr. Easton <u>7/</u>	65	55	Apr-July	105	95	91	119
	60	58	Apr-June	91	88	84	104
Cle Elum River	310	65	Apr-Sept		348	417	479
nr. Roslyn <u>8/</u>	275	63	Apr-July	350	326	372	435
	240	67	Apr-June	314	292	318	358
Bumping River	90	62	Apr-Sept	129	99	119	146
nr. Nile <u>9/</u>	80	60	Apr-July	120	92	108	133
	65	61	Apr-June	111	82	93	106
American River							
nr. Nile	80	63	Apr-Sept		81	111	127
	70	60	Apr-July		74	93	116
	60	63	Apr-June		66	84	95
Tieton River	165	65	Apr-Sept	224	179	228	252
at Tieton Dam <u>10/</u>	140	66	Apr-July	192	148	188	212
	110	65	Apr-June	166	120	148	168
Naches River	520	58	Apr-Sept	729	574	721	894
nr. Naches <u>11/</u>	470	58	Apr-July	694	528	657	807
	380	56	Apr-June	638	478	564	680
Ahtanum Creek	30	64	Apr-Sept			48	47
nr. Tampico <u>12/</u>	25	60	Apr-July			43	42
	20	54	Apr-June			37	37

4/ Observed flow corrected for storage in Lake Keechelus.

5/ Observed flow corrected for storage in Keechelus, Kachess, and Cle Elum Lakes and diversion by Kittitas Canal.

6/ Observed flow corrected for storage in Keechelus, Kachess, Cle Elum, Bumping, and Rimrock Lakes and diversions by Roza, Union Gap, New Reservation, Old Reservation, and Sunnyside Canals.

7/ Observed flow corrected for storage in Lake Kachess.

8/ Observed flow corrected for storage in Lake Cle Elum.

9/ Observed flow corrected for storage in Bumping Lake.

10/ Observed flow corrected for storage in Rimrock Lake.

11/ Observed flow corrected for storage in Bumping and Rimrock Lakes and diversions by Tieton, Selah Valley, Wapatox Canals, and City of Yakima.

12/ Observed flow of North and South Forks (Combined).

Basin, Stream and Station	Forecast Runoff 1981	Seasonal Streamflow in Thousands of Acre-Feet					
		% 15-yr. Avg.	Fore- cast period	1980	1979	1978	15-yr. Average 63-77
<u>LOWER COLUMBIA RIVER SYSTEM</u>							
Mill Creek	9.86	56	Apr-Sept		22.37	12.11	17.50
at Walla Walla	9.55	55	Apr-July		22.25	11.99	17.33
	9.51	55	Apr-June		22.14	11.91	17.15
Lewis River	750	58	Apr-Sept	1001	962	904	1301
at Ariel <u>13/</u>	660	58	Apr-July	883	830	610	1131
	580	58	Apr-June	798	749	515	995
Cowlitz River	1340	63	Apr-Sept	1626	1563	1635	2125
bl. Mayfield Dam	1130	61	Apr-July	1432	1367	1348	1853
	930	60	Apr-June	1275	1203	1150	1552
Cowlitz River	1650	60	Apr-Sept	1976	2046	2232	2767
at Castle Rock <u>14/</u>	1350	56	Apr-July	1852	1792	1835	2401
	1150	57	Apr-June	1649	1574	1581	2028
<u>OLYMPIC PENINSULA</u>							
<u>DUNGENESS RIVER SYSTEM</u>							
Dungeness River	115	72	Apr-Sept		110	152	160
nr. Sequim	95	73	Apr-July		90	115	130
	70	73	Apr-June		71	83	96
<u>PUGET SOUND</u>							
<u>SKAGIT RIVER SYSTEM</u>							
Skagit River	1500	68	Apr-Aug		1523	1903	2212
at Newhalem <u>15/</u>	1600	68	Apr-Sept		1648	2115	2356
	1300	66	Apr-July		1359	1690	1972
	1000	67	Apr-June		1102	1285	1485
<u>ELWHA RIVER SYSTEM</u>							
Elwha River	320	58	Apr-Sept		404	458	553
nr. Port Angeles	260	57	Apr-July		330	351	454
<u>GREEN RIVER SYSTEM</u>							
Green River	130	41	Apr-Sept		227	199	316
bl. Howard Hanson Dam <u>16/</u>							
<u>CEDAR RIVER SYSTEM</u>							
Cedar River	50	54	Apr-Sept		70	59	93
nr. Cedar Falls							

13/ Observed flow corrected for storage in Lake Merwin, Yale and Swift Reservoirs.

14/ Observed flow corrected for storage in Mayfield Reservoir.

15/ Observed flow corrected for storage in Diablo, Ross and Gorge Reservoirs.

16/ Observed flow corrected for storage in Howard Hanson Dam.

RESERVOIR STORAGE - 1000 Acre Feet

BASIN OR STREAM	RESERVOIR	USABLE <u>1/</u> CAPACITY	1981	1980	Measured April 1 1979	Normal*
COLUMBIA						
Spokane	Coeur d'Alene Lake	225.1	170.4	87.1	152.1	121.6
Columbia	Franklin D. Roosevelt Lake	5232.0	4224.7	1374.8	1879.4	1260.0
Columbia	Banks Lake	714.9	685.5	688.2	650.7	590.8
Okanogan	Conconully Reservoir	13.0	8.6	4.0	10.6	7.2
Okanogan	Conconully Lake	10.5	10.4	8.3	10.5	7.5
Chelan	Lake Chelan	676.1	408.9	92.0	131.6	184.6
YAKIMA						
Yakima	Keechelus Lake	157.8	156.9	94.4	101.9	108.8
Kachess	Kachess Lake	239.0	217.2	92.2	207.9	189.8
Cle Elum	Lake Cle Elum	436.9	304.2	363.4	128.4	292.1
Bumping	Bumping Lake	33.7	33.1	27.4	11.5	8.6
Tieton	Rimrock Lake	198.0	197.3	96.5	154.4	142.2
PUGET SOUND						
Skagit	Ross Reservoir	1404.1	1188.8	511.3	688.3	754.4
Skagit	Diablo Reservoir	90.6	87.5	87.1	88.4	85.7
Skagit	Gorge Reservoir	9.8	8.3	7.8	8.0	8.0

1/ Based on Active Storage

* 15-yr. Average 1963-1977

COMPARISON OF SNOW COVER WITH THAT OF PREVIOUS YEARS

The following tabulation of Washington stream basins presents the water content of the snow about April 1, 1981, as percent of the same date in 1980 and 1979 and average of record. We have also added a comparison of 1977 data with average for your information, since 1977 was considered a low water year.

Tributary Basin	No. of Courses Average	1981 Snow Water Expressed as percent of			1977
		1980	1979	1963-77 Avg.	as percent of Average

UPPER COLUMBIA BASIN

Pend Oreille	14	59	60	50	49
Kettle	10	66	100	59	54
Colville	2	39	32	32	40
Spokane	10	51	39	33	49
Sanpoil	1	82	109	63	38
Okanogan	36	70	118	58	54
Methow	6	71	280	64	37
Chelan	4	58	73	53	46
Entiat	10	69	84	54	38
Wenatchee	7	30	32	24	38
Yakima	15	39	48	33	32
Ahtanum	1	63	76	54	29

LOWER COLUMBIA BASIN

Mill Creek	3	26	6	22	56
Lewis	5	-	-	21	48
Cowlitz	2	27	47	32	39

PUGET SOUND

White	3	63	68	48	38
Green	8	22	21	16	42
Snoqualmie	2	18	17	12	47
Skykomish	2	30	32	24	48
Skagit	12	55	63	41	42
Baker	1	27	31	21	49
Nooksack	1	27	31	21	71

OLYMPIC PENINSULA

Elwha	1	26	16	10	54
Morse	1	39	36	25	-
Dungeness	1	41	34	28	52

PRECIPITATION 1/
Division Average Observations and Departures

Drainage Divisions	FALL		WINTER	
	Sept-Oct Observed	1980 <u>2/</u> Departure	Nov. 1980 Observed	- Mar. 1981 <u>2/</u> Departure
Columbia in Canada	3.76	-1.26	14.49	-1.02
Pend Oreille - Spokane	2.75	-1.29	15.12	-2.43
Northeastern Washington	2.37	-0.11	8.49	-0.91
Southeastern Washington	2.33	-0.18	11.21	+0.78
Central Washington	1.60	+0.63	5.50	+0.22
North Central Washington	1.45	-0.14	7.16	+0.62
Northwest Slope Cascades	7.35	-5.86	52.10	-3.29
Southwest Slope Cascades	3.89	-4.79	38.40	-3.24

Northeastern Washington	- Lower Spokane, Colville, Sanpoil, and Lower Kettle Drainages.
Southeastern Washington	- Touchet, Tucannon, and Palouse Drainages.
Central Washington	- Yakima, Wenatchee, and Chelan Drainages.
North Central Washington	- Methow and Okanogan Drainages.
Northwest Slope Cascades	- Puget Sound Drainages.
Southwest Slope Cascades	- Lower Columbia Drainages.

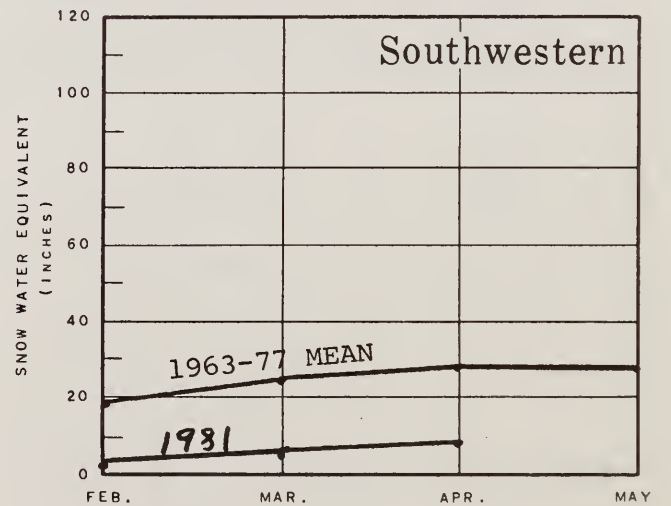
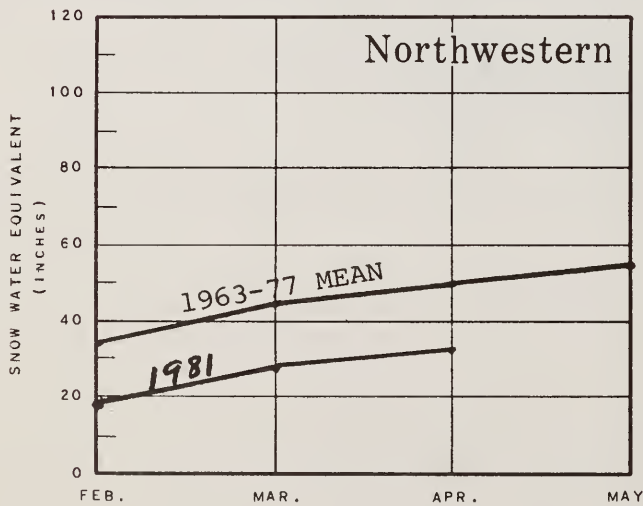
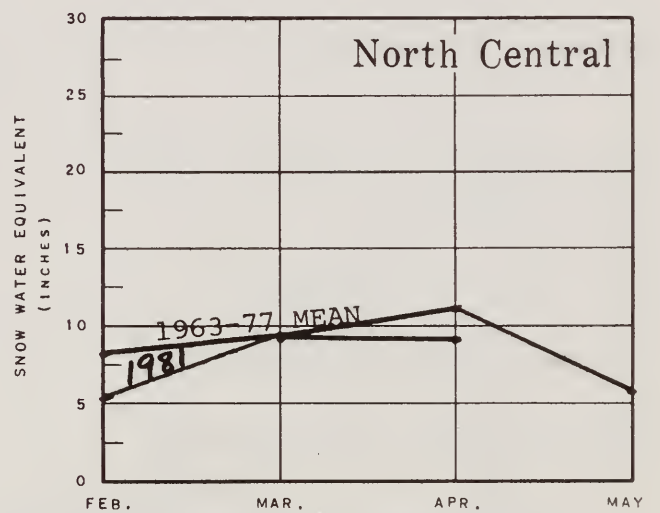
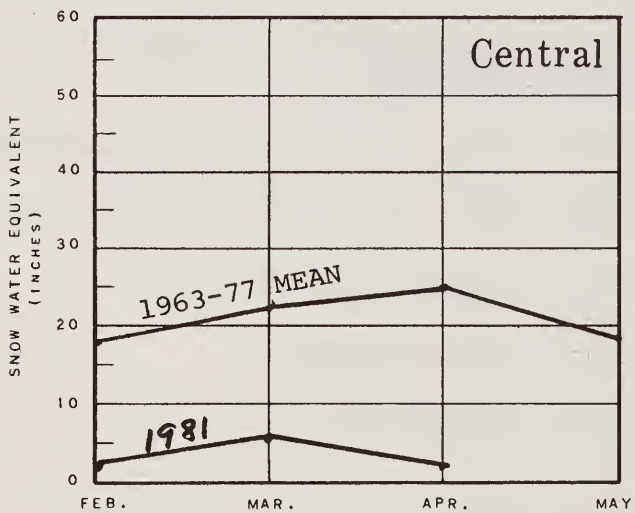
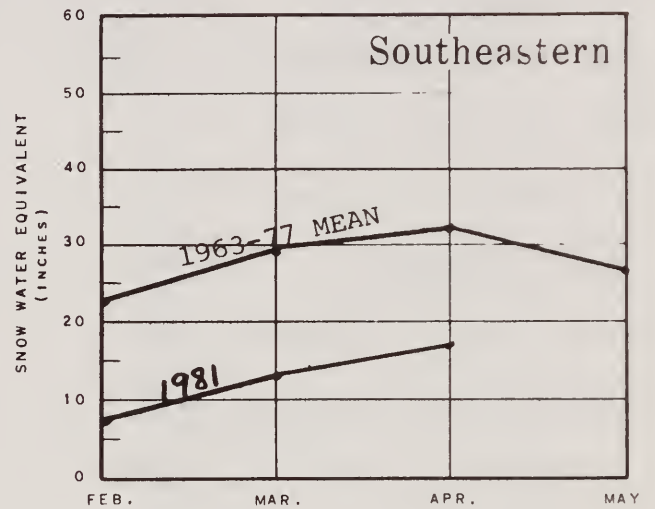
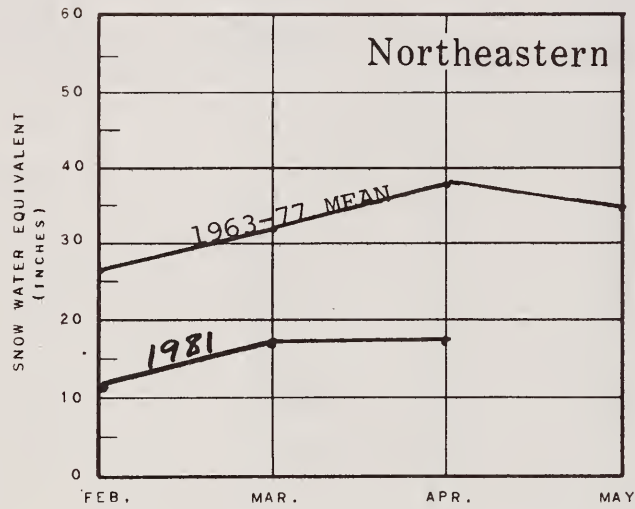
1/ - Preliminary analysis by National Weather Service from data furnished by Meteorological Services of Canada and the National Weather Service.

2/ - Departure from 15-year (1958-72) drainage division average.

WASHINGTON SNOW COVER

1981

DRAINAGE AREAS

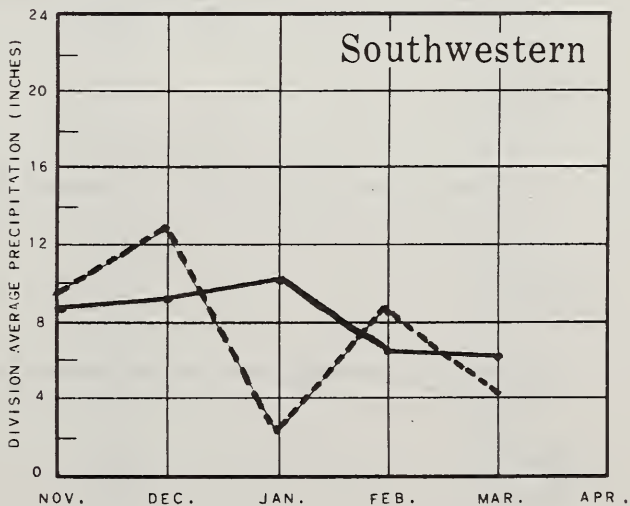
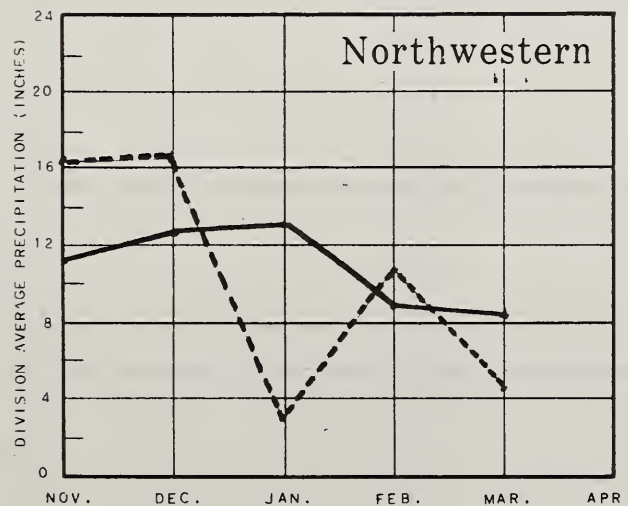
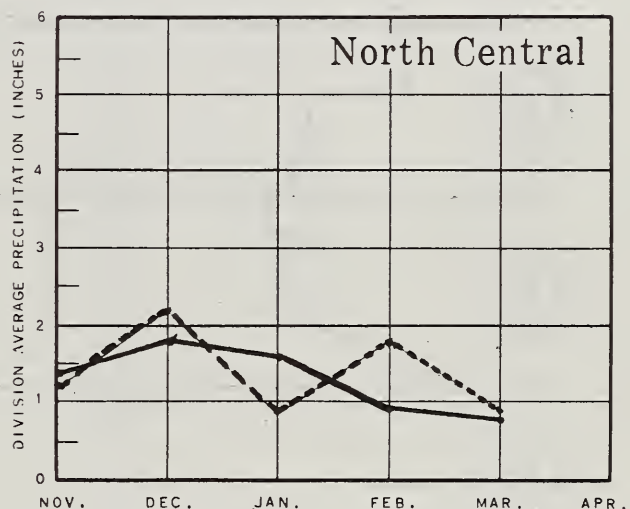
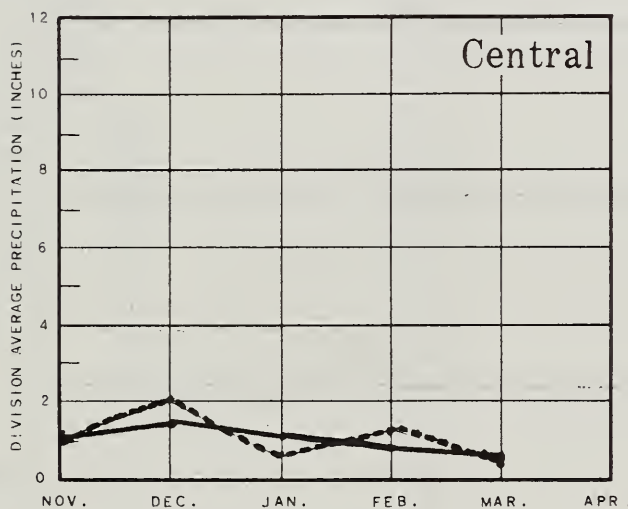
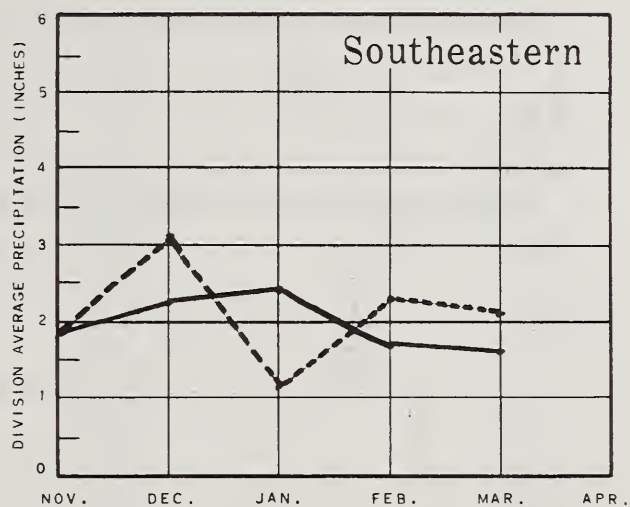
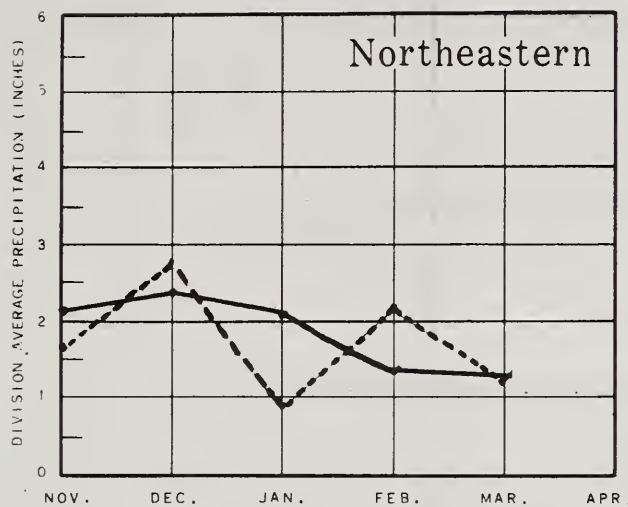


Selected Snow Survey Courses by Soil Conservation Service

WASHINGTON VALLEY PRECIPITATION

1981

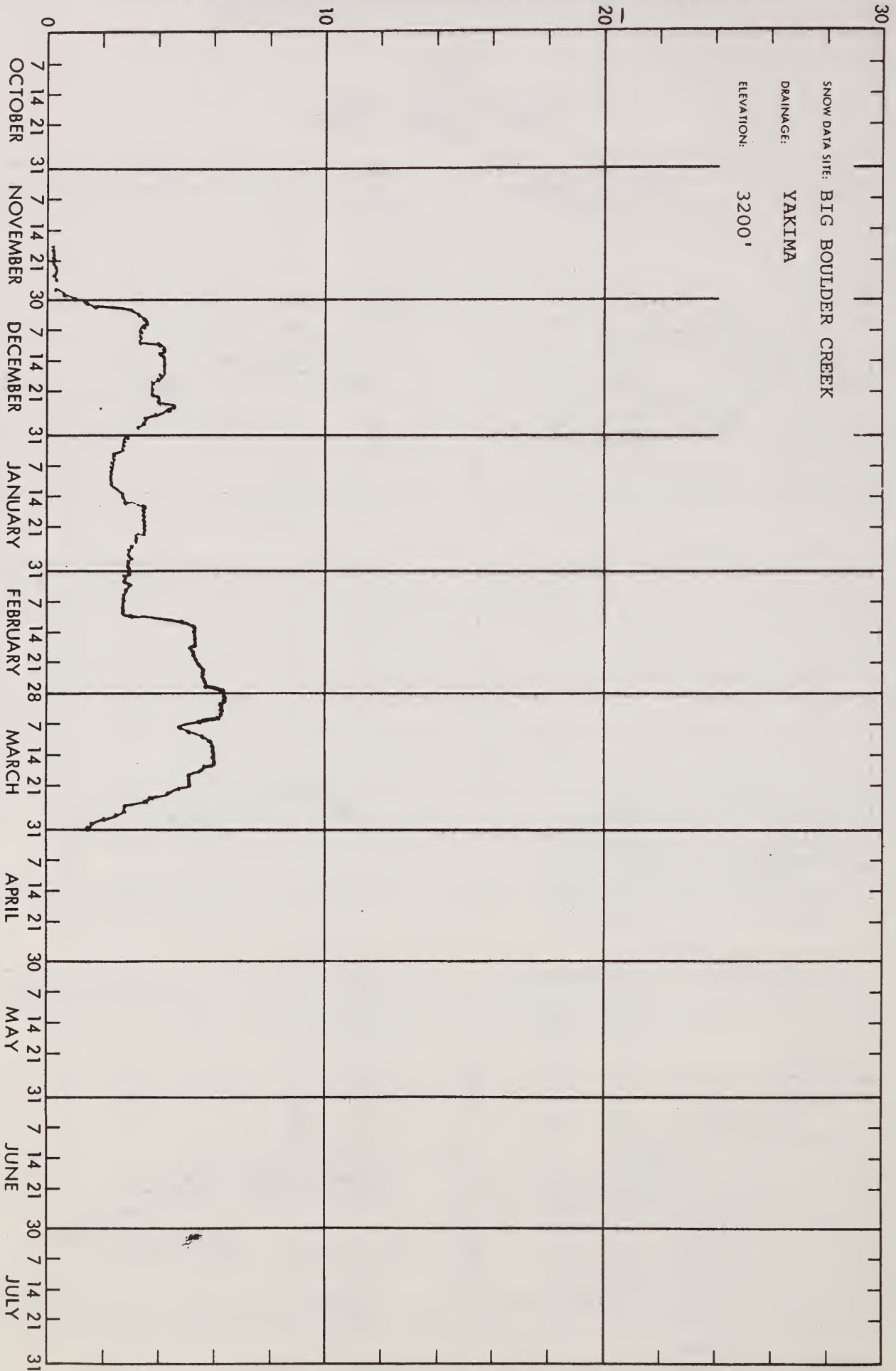
DRAINAGE AREAS



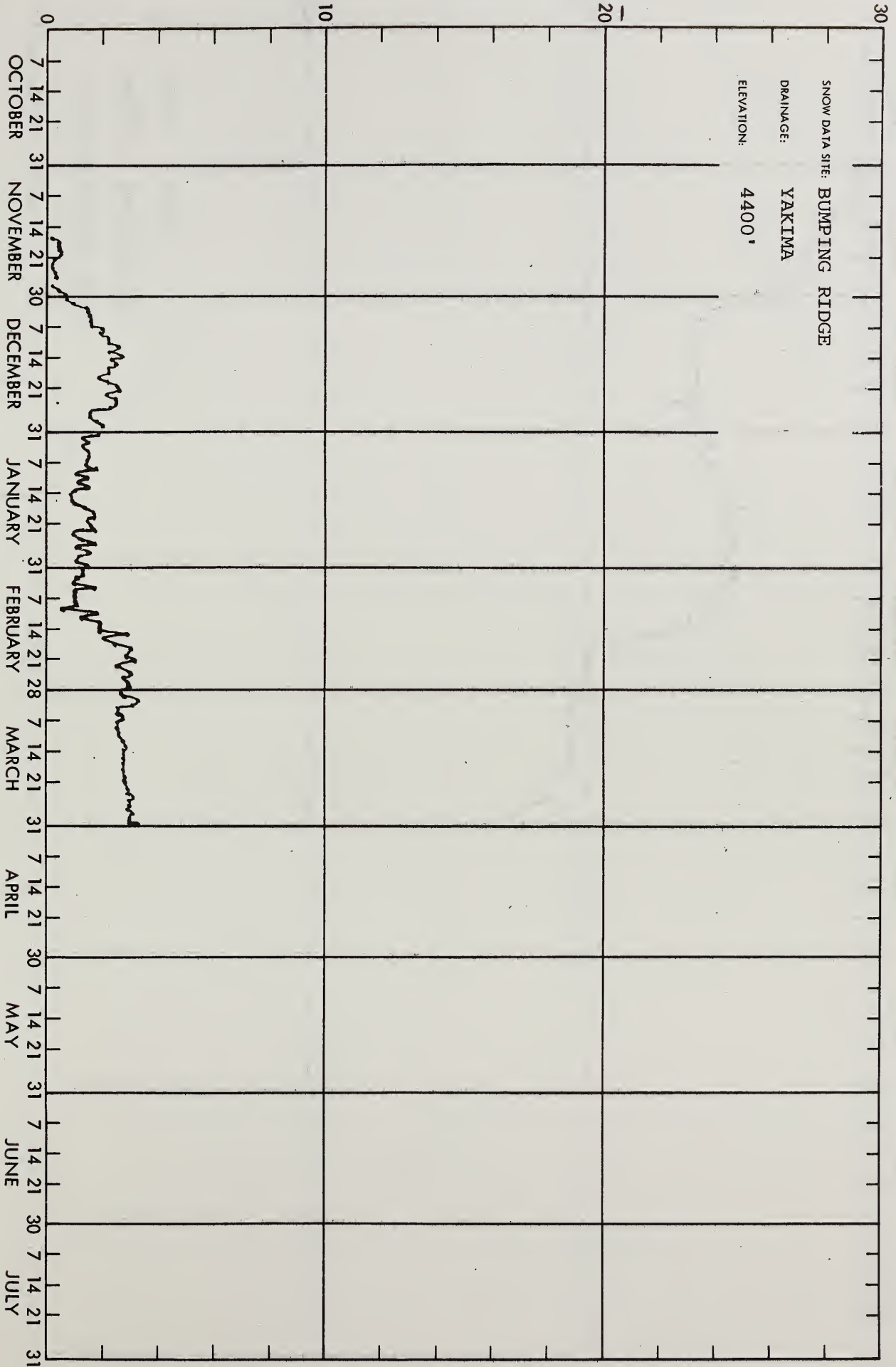
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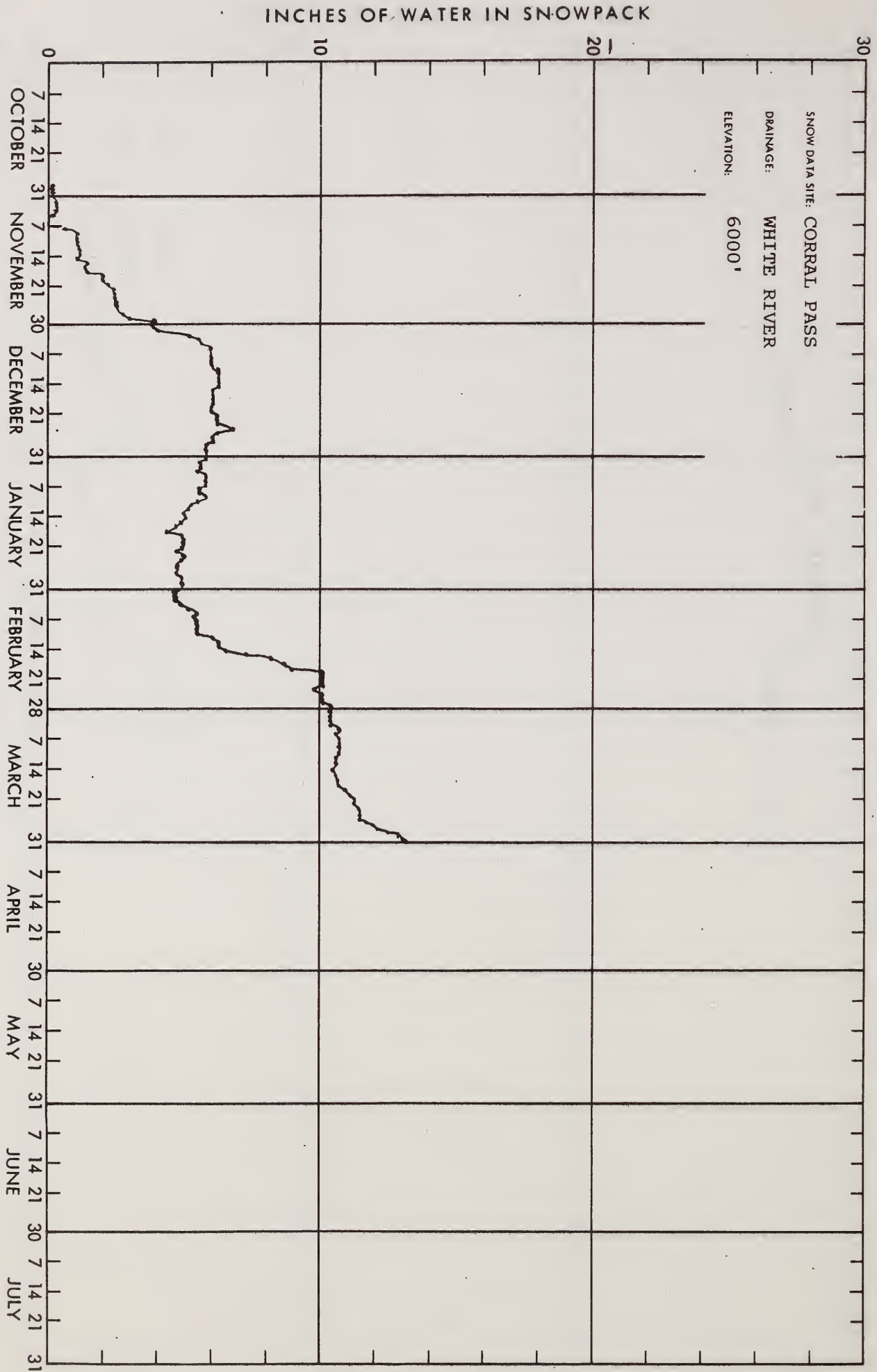
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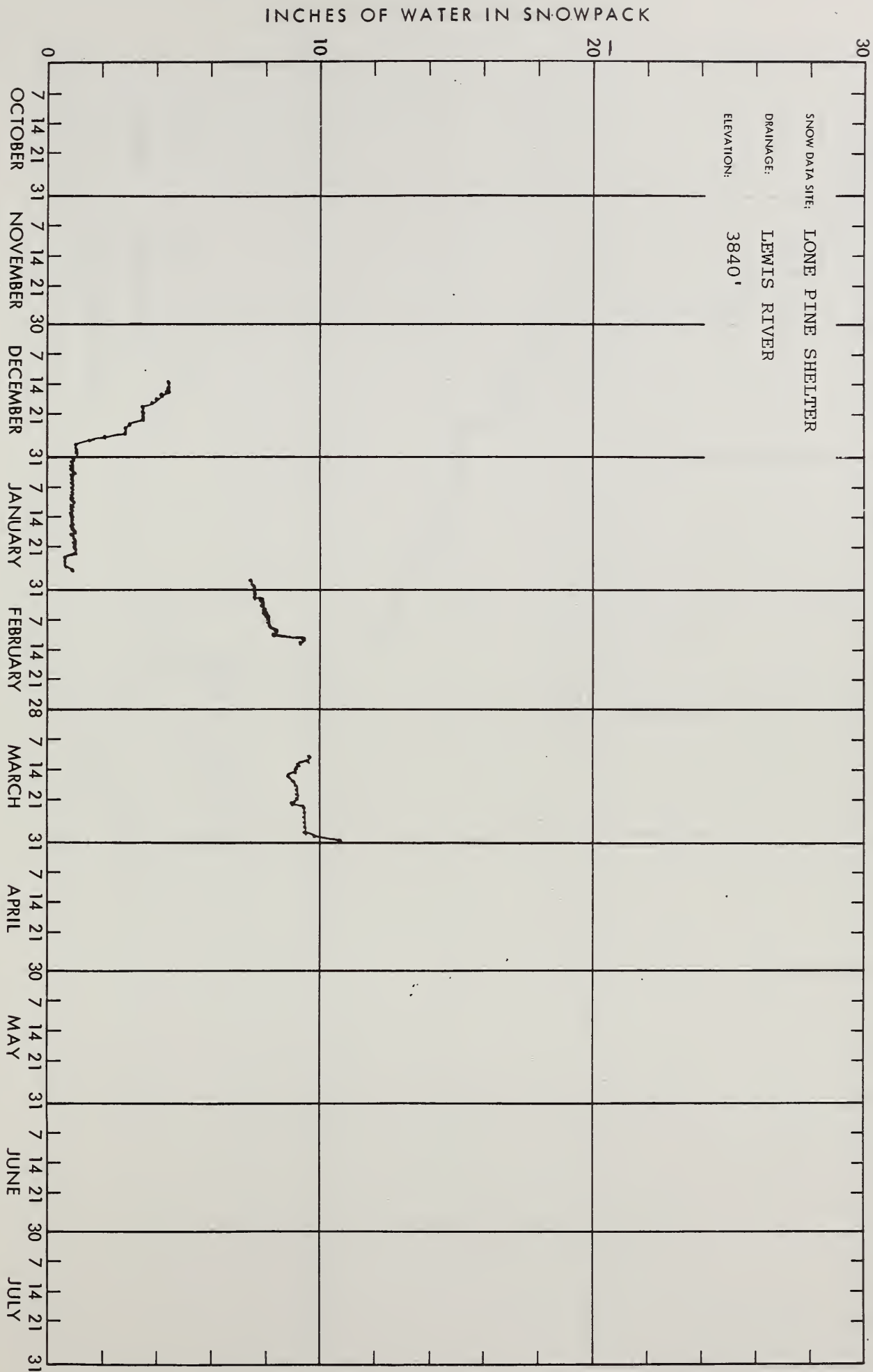
INCHES OF WATER IN SNOWPACK

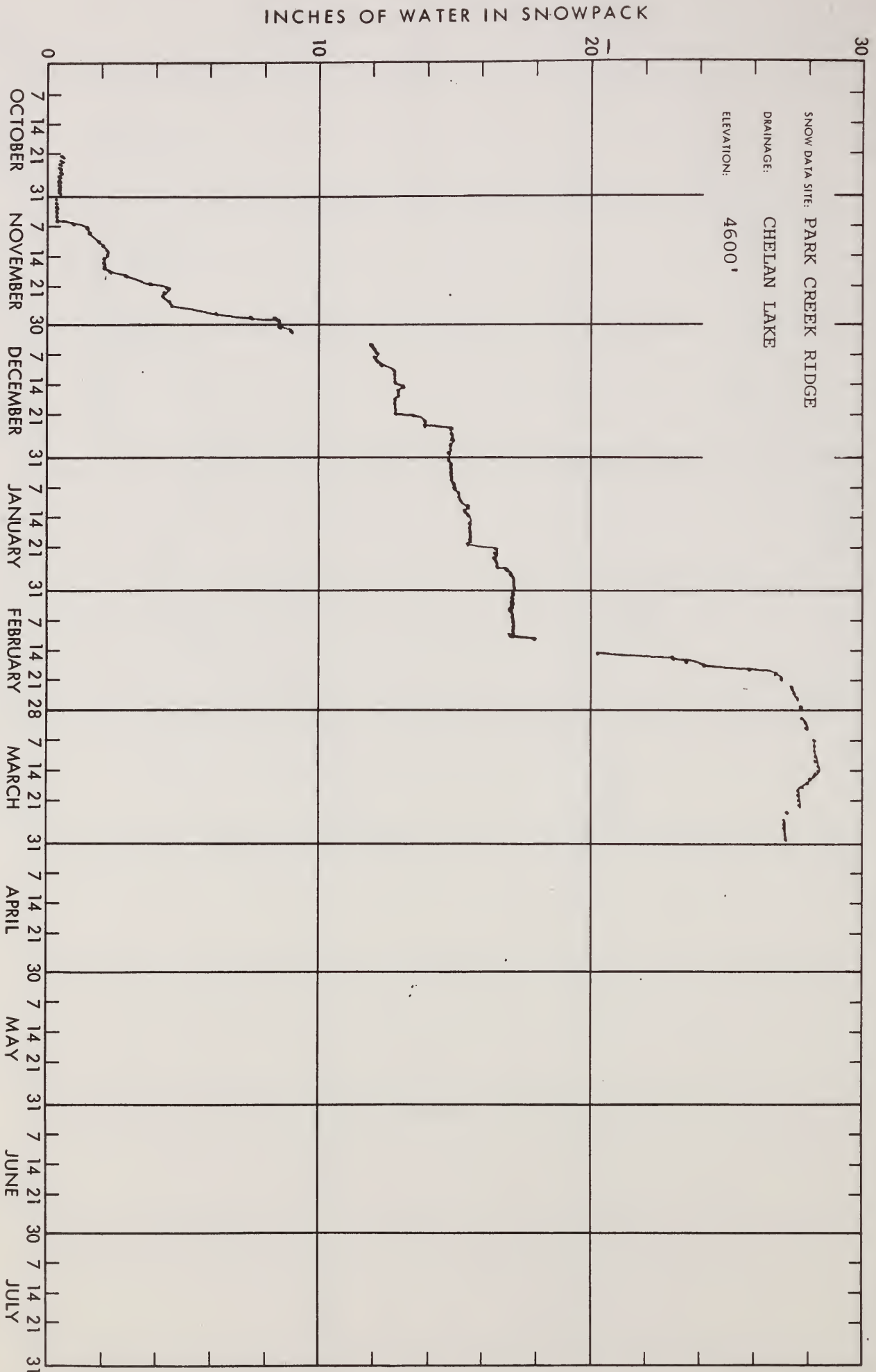


INCHES OF WATER IN SNOWPACK

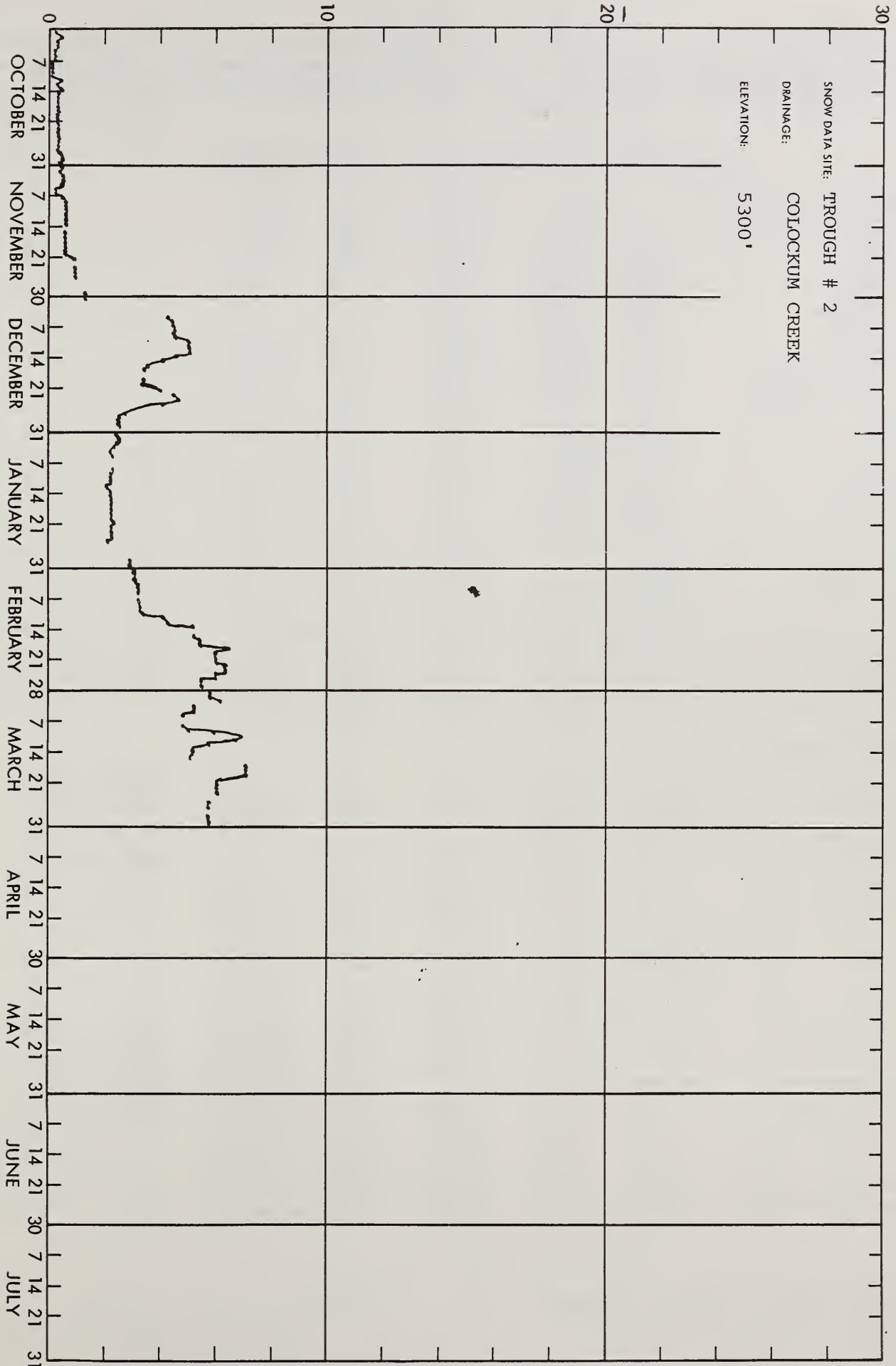








INCHES OF WATER IN SNOWPACK



SNOW DATA TO APRIL 1, 1981 - APPENDIX 1

SNOW

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD		
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		
NAME	Number	Elevation				Last Year	1977	Avg. #

U P P E R C O L U M B I A D R A I N A G E

PEND OREILLE RIVER

Baree Creek	15B11	5500	3/31	73	28.0	37.5	29.5	50.3
Baree Midway	15B16	4600	3/31	49	16.1	32.4	23.8	38.8
Baree Trail	15B15	3800	3/31	1	0.5	7.8	3.8	9.8
Benton Meadow	16A02	2344	3/30	0	0.0	4.6	0.0	5.0
Benton Spring	16A03	4900	3/30	26	9.5	15.9	7.8	20.2
Boyer Mountain	17A02	5250	3/30	42	15.3	21.5	11.4	27.2
Brush Creek Timber	14A13	5000	3/30	17	3.9	8.2	5.4	10.6
Bunchgrass Meadow	17A01	5000	3/30	65	23.2	28.6	13.4	30.7
Chewelah	17A04	4923	2/28	26	8.3	13.3	8.8	17.0
Heart Lake Trail	14C10	4800	3/31	28	8.2	18.4	11.6	23.8
Hoodoo Basin	15C10	6000	3/31	97	34.4	47.2	23.0	53.6
Hoodoo Creek	15C01	5900	3/31	84	28.5	42.8	22.4	49.9
Lookout	15B02	5250	3/16	46	17.2	24.8	15.4	38.6
			3/31	50	17.0	26.4	18.6	37.1
Mosquito Ridge	16A04A	5100	4/4	77	25.6	28.2	19.6	40.2
Nelson	2D04-Can	3050	3/31	20	8.0	15.3	8.7	15.6*
Schweitzer Bowl	16A06	4500	3/31	Plowed Out		25.1	17.8	30.9
Schweitzer Ridge	16A05	6100	3/31	90	38.1	52.4	21.4	47.8
Smith Creek	16A01	4800	3/30	82	34.2	39.6	25.1	48.8
Winchester Creek	17A03	2970	3/30	0	0.0	8.7	4.6	11.2

KETTLE RIVER

Barnes Creek	2B06-Can	5300	4/2	54	16.2	15.0	18.0	20.9*
Big White Mtn.	2E03-Can	5500	3/31	46	15.2	17.0	14.1	20.6*
Bluejoint Mtn.	2E06-Can	7500	4/2	71	23.5	25.3	14.9	24.8*
Boulder Road	18A02	1450	3/26	0	0.0	0.0	0.0	2.4
Butte Creek	18A03	4070	3/26	20	5.8	9.4	5.8	9.5
Cabin Creek	18A08	3170	3/26	17	5.7	7.7	4.5	8.3
Carmi	2E02-Can	4100	3/31	10	3.5	4.7	4.6	6.6*
Farron # 1	2B02-Can	4000	3/30	29	10.4	14.2	6.8	13.3*
Farron # 2	2B02A-Can	4000	3/30	31	10.7	15.0	7.6	13.1*
Goat Creek	18A04	3595	3/26	1.7	1.1	6.5	1.8	5.3
Graystoke Lake	2F04-Can	5950	3/30	33	8.6	10.9	11.4	19.4*
Monashee Pass	2E01-Can	4500	4/2	33	10.9	9.6	12.4	14.0*
Old Glory Mountain	2B03-Can	7000	4/4	76	25.8	30.2	14.1	28.7*
Snow Caps Creek	18A05	2150	3/26	0	0.0	0.0	0.0	2.2
Snow Caps Trail	18A06	2720	3/26	0	0.0	5.4	1.4	4.9
Summit G. S.	18A07	4600	3/26	13	4.4	7.4	4.4	8.5
Trapping Creek Lower	2E05-Can	3050	3/31	0	0.0	2.9	2.2	3.9*
Trapping Creek Upper	2E04-Can	4450	3/31	19	5.7	8.7	8.6	10.2*

Average based on 1963-77 average

* Average for years of record

SNOW DATA TO APRIL 1, 1981 - APPENDIX 2

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD		
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		Avg. #
NAME	Number	Elevation				Last Year	1977	

COLVILLE RIVER

Baird	17A06	3215	3/28	0	0.0	6.0	0.0	5.6
Carlson	18A09	2885	3/28	0	0.0	0.0	0.0	2.6
Chewelah	17A04	4925	3/28	26	8.3	13.3	8.8	17.0
Stranger Mountain	17A05	4990	3/28	7.2	2.0	12.6	8.0	14.5
Togo	18A10	3370	3/28	0	0.0	12.8	4.8	12.9

SPOKANE RIVER

Above Burke	15B08	6100	3/31	25	8.4	17.4	15.3	24.7
Above Roland	15B07	4350	4/4	40	13.6	25.4	15.0	35.2
Below Roland	15B06	3770	4/4	0	0.0	12.4	5.1	16.5
Copper Ridge	16B02	4800	4/1	17	3.6	10.2	14.6	29.7
Forty-nine Meadows	15B03	5000		Late Report		19.7	13.6	32.5
Fourth of July Summit	16B03	3100	3/30	0	0.0	3.9	6.0	8.8
Granite Peak	15B13A	6000		Late Report		33.8	19.8	46.8
Kellogg Peak	16B05A	5560	4/4	45	13.6	25.0	15.2	35.4
Lookout	15B02	5250	3/16	46	17.2	24.8	15.4	38.6
			3/31	50	17.0	26.4	18.6	37.1
Lost Lake	15B14A	6000		Late Report		40.3	25.2	61.8
Lower Sands Creek	16B01	3400	3/31	11	4.2	11.5	12.1	21.9
Mosquito Ridge	16A04A	5110	4/4	77	25.6	28.2	19.6	40.2
Roland Summit	15B05A	5200	4/4	44	13.0	30.2	16.0	40.1
Sherwin	16C01	3200	3/31	1	0.4	6.7	6.9	13.8
Sunset	15B09A	5600	4/4	62	17.0	22.0	18.0	36.2

SANPOIL RIVER

Sherman Creek Pass	18A01	5350	3/27	32	9.4	11.4	6.0	15.0
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OKANOGAN RIVER

Aberdeen Lake	1F01A-Can	4300	3/31	8.3	2.6	5.8	5.1	6.2*
Blackwall Mountain	2G03-Can	6250	3/27	66	22.8	30.4	19.4	34.9*
Bouleau Lake	2F21-Can	4580	3/28	33	9.4	11.0	7.9	15.7*
Brenda Mine	2F18-Can	4800	3/27	29	7.8	11.9	7.5	13.9*
Brookmere	1C01-Can	3200	3/25	19	6.9	8.3	5.0	9.5*
Enderby	1F04-Can	6250	3/27	88	34.8	34.0	29.5	38.9*
Esperon Creek Lower	2F15-Can	4400	3/29	24	7.1	8.5	4.6	12.1*
Esperon Creek Middle	2F14-Can	4700	3/29	30	9.1	12.0	8.8	15.8*
Esperon Creek Upper	2F13-Can	5400	3/29	33	10.6	13.9	10.7	19.1*
Freezeout Meadow New	20A38	5000	4/1	48	17.6	23.7	16.0	41.0
Grayback Res.	2F08-Can	5225	3/27	18	5.7	8.1	5.7	9.3
Graystoke Lake	2F04-Can	5950	3/30	33	8.6	10.9	11.4	19.4*
Hamilton Hill	2G06-Can	4900	3/29	26	9.1	14.8	9.7	15.8*
Harts Pass	20A05A	6500	3/28	83	30.6	39.6	22.0	48.5

Average based on 1963-77 average

* Average for years of record

SNOW DATA TO APRIL 1, 1981 - APPENDIX 3

SNOW

SNOW			THIS YEAR			PAST RECORD		
DRAINAGE BASIN and/or SNOW COURSE			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		Avg. #
NAME	Number	Elevation				Last Year	1977	
OKANOGAN RIVER (Cont.)								
Horseshoe Basin +	19A05a	7000	4/2	48	12.5	-	11.8	19.4
Isintok Lake	2F11-Can	5510	3/28	13	3.1	6.7	3.5	8.3*
Lightning Lake	3D02-Can	4000	3/30	17	5.9	10.6	5.5	14.4*
Lost Horse Mountain	2G04-Can	6300	4/1	27	6.8	10.0	6.5	9.4*
Loup Loup	19A07	4650	3/30	15	6.2	11.4	1.6	9.2
McCulloch	2F03-Can	4200	3/29	11	4.1	5.7	5.2	6.7*
Missezula Mountain	2G05-Can	5100	3/28	20	6.7	9.9	5.5	9.1*
Mission Creek	2F05-Can	6000	3/30	46	13.0	15.2	16.8	20.2*
Monashee Pass	2E01-Can	4500	4/2	33	10.9	9.6	12.4	14.0*
Mount Kobau	2F12-Can	5950	3/29	35	9.8	11.3	5.6	12.8*
Muckamuck +	19A09a	6390	4/1	Not Measured		15.5	6.2	17.9
Mutton Creek No. 1	19A01	5700	3/27	25	9.2	10.6	4.7	14.7
Mutton Creek No. 2 SP	19A11SP	6000	3/27	-	5.6	8.4	2.8	13.0
Nickel Plate Mtn.	2G02-Can	6200	3/30	15	2.6	8.7	7.0	8.3*
Oyama Lake	2F19-Can	4400	3/30	10	3.5	5.4	5.5	7.3*
Paysayten +	20A28a	4300	4/2	63	16.4	16.7	10.6	18.7
Postill Lake	2F07-Can	4500	3/30	24	6.8	7.2	8.1	9.1*
Rusty Creek	19A03	4000	3/27	8.7	3.8	6.0	0.6	6.6
Salmon Meadows	19A02	4500	3/27	23	9.2	11.7	3.1	10.3
Silver Star Mountain	2F10-Can	6050	3/29	59	20.2	23.8	19.2	28.6*
Starvation Mtn +	19A10a	6750	4/2	66	17.2	18.0	8.4	20.7
Summerland Reservoir	2F02-Can	4200	3/28	17	4.7	8.6	4.8	9.4*
Sunday Summit	2G01A-Can	4300	3/30	1.2	0.4	6.3	2.3	5.2*
Touts Coulee	19A06	2845	3/31	0	0.0	0.8	0.5	1.8
Trout Creek	2F01-Can	4700	3/30	9.8	2.9	6.2	4.2	7.6*
Vaseux Creek	2F20-Can	4600	3/30	17	7.2	6.3	5.0	6.7*
White Rocks Mountain	2F09-Can	6000	3/30	40	12.7	18.3	13.3	23.5*

METHOW RIVER

Billy Goat Pass +	20A10a	6409	4/1	Not Measured		18.0	-	38.0
Dollar Watch +	20A29a	7000	4/1	Not Measured		-	-	31.9
Harts Pass	20A05A	6500	3/28	83	30.6	39.6	22.0	48.5
Horseshoe Basin +	19A05a	7000	4/2	48	12.5	-	11.8	19.4
Loup Loup	19A07	4650	3/30	15	6.2	11.4	1.6	9.2
Mutton Creek No. 1	19A01	5700	3/27	25	9.2	10.6	4.7	14.7
Mutton Creek No. 2 SP	19A11SP	6000	3/27	-	5.6	8.4	2.8	13.0
Rusty Creek	19A03	4000	3/27	8.7	3.8	6.0	0.6	6.6
Salmon Meadows	19A02	4500	3/27	23	9.2	11.7	3.1	10.3

CHELAN LAKE BASIN

Cloudy Pass +	20A22a	6500	4/1	98	34.3	-	22.8	49.8
Little Meadows +	20A24a	5275	4/1	76	26.6	42.6	-	49.0
Lyman Lake	20A23A	5900	4/4	100	37.3	49.5	28.3	65.5
Park Creek Ridge	20A12A	4600	4/1	62	22.3	40.2	19.1	47.0
Rainy Pass	20A09	4780	3/28	64	23.1	33.0	22.8	43.7
Mirror Lake	20A39	5600	4/4	73	25.0	-	-	New

Average based on 1963-77 average

* Average for years of record

+ Snow water equivalent estimated from aerial stadia observation

SNOW DATA TO APRIL 1, 1981 - APPENDIX 4

SNOW

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD		Avg. #
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		
NAME	Number	Elevation				Last Year	1977	

ENTIAT RIVER

Blue Creek G. S.	20B28a	5425	3/30	72	26.6	-	23.0	43.5
Brief	20B19	1600	3/28	0	0.0	3.5	0.0	4.6
Entiat Meadows +	20A33a	4540	3/30	78	28.9	21.0	19.2	49.3
Entiat River Trail +	20A34a	3325	3/30	10	3.8	16.6	8.6	18.2
Four Mile Ridge +	20B27a	6800	3/30	60	22.2	29.4	15.4	37.8
Fox Camp +	20A36a	6510	3/30	126	46.6	-	27.5	57.8
Pope Ridge	20B20	3540	3/27	19	7.2	16.9	4.1	18.9
Pugh Ridge +	20A32a	6725	3/30	73	27.0	34.0	15.7	37.5
Shady Pass	20A37	6200	3/31	54	20.1	24.5	10.3	32.9
Snow Brushy +	20A35a	3910	3/30	57	21.7	32.8	20.7	40.3
Tommy Creek +	20B21a	4900	3/30	28	10.4	22.4	7.0	27.3

WENATCHEE RIVER

Berne-Mill Creek	21B23	2925	3/13	31	12.7	23.3	9.1	26.1
			3/30	26	10.0	26.2	12.0	29.8
Berne-Mill Creek New SP	21B41	3240	3/30	5.2	1.9	25.0	10.2	28.3
Blewett Pass No. 2	20B02	4270	3/27	8.6	3.0	14.4	4.4	16.9
Chiwaukum G.S.	20B16	1810	3/13	13	5.3	10.3	2.8	11.3
			3/30	0	0.0	10.1	0.0	10.2
Fish Lake	21B04	3371	3/13	27	11.1	-	-	-
			3/27	18	7.1	30.5	15.1	35.3
Lake Wenatchee	20B05	1970	3/13	12	4.7	10.8	4.6	15.4
			3/30	0	0.0	10.6	4.4	12.9
Leavenworth R. S.	20B17	1127	3/12	0	0.0	1.4	-	2.2
			3/27	0	0.0	0.0	0.0	0.6
Lyman Lake	20A23A	5900	4/4	100	37.3	49.5	28.3	65.5
Merritt	20B18	2140	3/13	12	4.6	12.0	4.7	16.0
			3/30	0	0.0	11.9	2.9	15.5
Stevens Pass	21B01	4070	3/13	42	17.3	39.7	19.1	52.3
			3/30	40	17.2	45.5	25.9	54.9
Stevens Pass Sand Shed	21B45	3700	3/13	23	9.5	27.2	10.3	37.5
			3/30	19	6.9	29.8	15.4	39.5

SQUILCHUCK CREEK

Beehive Springs	20B03	4400	3/31	2.2	0.9	10.6	1.4	7.9
Scout-A-Vista	20B04	3400	3/31	6.7	2.7	10.7	0.3	7.3

STEMILT CREEK

Jump-Off	20B08	4450	3/30	3.2	1.4	10.6	1.6	8.2
Stemilt Slide	20B06	5000	3/30	14	5.0	13.3	2.7	13.7
Upper Wheeler	20B07	4400	3/30	0	0.0	9.9	1.1	8.7

COLOCKUM CREEK

Colockum Creek Upper	20B22	5300	3/30	10	3.9	12.4	3.4	15.1
Colockum Creek Lower	20B23	4300	3/30	4.5	1.8	11.8	1.2	9.9
Trough # 2	20B25SP	5310	3/30	18	7.0	19.0	3.2	New

Average based on 1963-77 average

+ Snow water equivalent estimated from aerial stadia observation

SNOW DATA TO APRIL 1, 1981 - APPENDIX 5

SNOW			THIS YEAR			PAST RECORD		
DRAINAGE BASIN and/or SNOW COURSE			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		Avg. #
NAME	Number	Elevation				Last Year	1977	
YAKIMA RIVER								
Ahtanum R. S.	21C11	3100	3/17	0	0.0	-	-	-
			3/26	0	0.0	10.0	0.0	6.0
Big Boulder Creek	21B09	3200	3/13	7.4	2.7	-	-	-
			3/27	0	0.0	13.7	7.3	20.1
Blewett Pass No. 2	20B02	4270	3/27	8.6	3.0	14.4	4.4	16.9
Bumping Lake	21C08	3450	3/13	4.4	1.8	17.9	2.9	17.1
			3/26	0	0.0	18.3	3.1	16.5
Bumping Lake New	21C36	3400	3/13	12	5.6	19.7	3.3	22.0
			3/26	0	0.0	21.2	4.4	21.7
Cayuse Pass	21C06	5300	3/31	100	36.9	-	38.1	90.3
Colockum Pass	20B09	5370	3/30	20	8.2	17.3	3.8	16.6
Cooke Creek	20B10	4123	3/30	0	0.0	4.8	0.0	5.1
Corral Pass	21B13	6000	4/3	63	22.4	31.8	16.5	43.4
Fish Lake	21B04	3371	3/13	27	11.1	-	-	-
			3/27	18	7.1	30.5	15.1	35.3
Green Lake	21C10	6000	3/17	38	16.1	-	-	-
			3/26	39	19.0	30.1	12.0	34.9
Grouse Camp	20B11	5385	3/31	24	9.8	20.8	4.9	16.6
High Creek	20B12	2930	3/31	0	0.0	6.9	0.0	3.6
Joe Lake +	21B46a	4624	3/12	69	27.7	-	-	-
			4/1	Not Measured		55.4	40.9	70.6
Lake Cle Elum	21B14M	2200	3/11	0	0.0	6.2	0.0	10.0
			3/24	0	0.0	2.7	0.0	6.7
Lemah Creek +	21B47a	3327	3/12	36	14.4	-	-	-
			4/1	15	5.3	32.6	21.1	46.6
Manashtash	20C01	3935	3/31	0	0.0	6.9	0.0	3.0
Morse Lake	21C17	5400	3/12	68	26.7	-	-	-
			3/30	75	30.0	54.0	19.9	59.6
Nanum	20B13	3875	3/31	Trace		8.8	0.0	8.2
Olallie Meadows	21B02	3625	4/3	34	8.5	36.6	22.6	51.9
Satus Pass	20D01	4030	4/1	0	0.0	6.6	0.0	9.6
Stampede Pass SP	21B10	3860	3/16	26	10.5	35.7	9.0	41.5
			3/26	23	9.5	44.9	14.4	43.9
Trail Creek	20B14	3360	3/30	0	0.0	0.0	0.0	0.0
Tunnel Avenue	21B08	2450	3/11	12	5.2	18.1	5.4	25.9
			3/24	4.2	1.8	21.7	7.5	24.6
Van Epps Pass +	20B26a	5925	3/12	65	26.1	-	-	-
			4/1	74	26.2	39.8	28.4	57.5
Walters Flat	20B15	3360	3/31	0	0.0	9.3	0.0	5.5
Waptus Lake +	21B49a	3024	3/12	39	15.6	-	-	-
			4/1	36	12.7	21.7	21.9	44.5
White Pass (E. Side)	21C28	4500	3/12	14	5.9	21.9	4.2	25.1
			3/25	13	6.3	23.5	7.4	26.0

Average based on 1963-77 average

+ Snow water equivalent estimated from aerial stadia observation

SNOW DATA TO APRIL 1, 1981 - APPENDIX 6

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD		
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		Avg. #
NAME	Number	Elevation				Last Year	1977	

LOWER COLUMBIA DRAINAGESASOTIN CREEK

Spruce Springs	17C04	5700	3/23	29	10.4	21.8	10.4	26.4
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MILL CREEK

Homestead	17C01	4030	3/26	4.9	0.5	9.1	4.8	8.9
Martin Springs	17C02	4400	3/26	9.8	1.0	12.9	7.3	14.9
High Ridge	18D19	4150	3/31	60	17.2	25.6	-	32.3

KLICKITAT RIVER

Satus Pass	20D01	4030	4/1	0	0.0	6.6	0.0	9.6
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LEWIS RIVER

Lone Pine Shelter	21C26	3800	4/1	-	11.8	SNOTEL		43.2
Marble Mountain	22C05	3200	4/1	-	5.1	SNOTEL		40.2
Plains of Abraham	22C01	4400	4/1	-	7.1	SNOTEL		72.0
Sheep Canyon	21C10	4920	4/1	-	5.4	SNOTEL		New
Spencer Meadow	21C20	3400	4/1	-	10.3	SNOTEL		25.7
Surprise Lakes	21C13	4250	4/1	-	8.3	SNOTEL		53.7

COWLITZ RIVER

Cayuse Pass	21C06	5300	3/31	100	36.9	-	38.1	90.3
Ryan Lake	22C08	3280	4/1	-	9.5	SNOTEL		New
White Pass (E. Side)	21C28	4500	3/12	14	5.9	21.9	4.2	25.1
			3/25	13	6.3	23.5	7.4	26.0

PUGET SOUND DRAINAGEWHITE RIVER

Cayuse Pass	21C06	5300	3/31	100	36.9	-	38.1	90.3
Corral Pass	21B13	6000	4/3	63	22.4	31.8	16.5	43.4
Morse Lake	21C17	5400	3/12	68	26.7	-	-	-
			3/30	75	30.0	54.0	19.9	59.6

GREEN RIVER

Airstrip	21B24	1800	3/30	0	0.0	0.0	0.0	2.1
Charley Creek	21B25	1200	3/30	0	0.0	0.0	0.0	0.0
Cougar Mountain SP	21B42	3200	4/3	14	3.3	14.3	10.4	25.1
Grass Mtn. No. 2	21B27	2900	3/30	1.7	1.2	13.3	8.8	24.3
Grass Mtn. No. 3	21B28	2100	3/30	0	0.0	0.0	2.2	4.9
Lester Creek	21B29	3100	3/30	6.0	1.8	21.9	12.8	27.5
Lynn Lake	21B50	4000	3/30	8.8	2.7	15.8	21.8	29.8
Sawmill Ridge	21B31	4700	4/1	45	13.2	27.6	17.1	41.6
Snowshoe Butte SP	21B43	5000	4/3	68	19.8	48.5	24.2	59.8
Stampede Pass SP	21B10	3860	3/16	26	10.5	35.7	9.0	41.5
			3/26	23	9.5	44.9	14.4	43.9
Twin Camp	21B30	4100	3/30	7.7	2.4	21.8	11.8	27.8

Average based on 1963-77 average

SNOW DATA TO APRIL 1, 1981 - APPENDIX 7

SNOW

SNOW			THIS YEAR			PAST RECORD		
DRAINAGE BASIN and/or SNOW COURSE			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		Avg. #
NAME	Number	Elevation				Last Year	1977	

CEDAR RIVER

City Cabin	21B03	2390	3/27	0	0.0	9.4	7.8	20.0
Mt. Gardner	21B21	3300	3/27	0	0.0	10.2	10.2	19.8
Mt. Lindsay	21B16	2500	3/27	0	0.0	11.4	6.6	18.2
Mt. Washington New	21B15	3000	3/27	0	0.0	6.0	6.8	10.8
Rex River	21B17	2400	3/27	0	0.0	12.2	9.4	17.8
S. F. Cedar	21B06	3000	3/27	0	0.0	11.3	8.0	23.2
Tinkham Creek	21B20	3400	3/27	0	0.0	18.9	11.2	27.9

SNOQUALMIE RIVER

Alpine Meadow	21B48	3500	3/27	13	4.9	33.9	24.1	55.2
Lake Elizabeth	21B19	2900	4/1	Not Measured		36.1	23.2	50.7
Olallie Meadows	21B02	3625	4/3	34	8.5	36.6	22.6	51.9
S. F. Tolt	21B18	1900	3/27	0	0.0	0.0	0.0	1.5

SKYKOMISH RIVER

Lake Elizabeth	21B19	2900	4/1	Not Measured		36.1	23.2	50.7
Stevens Pass	21B01	4070	3/13	42	17.3	39.7	19.1	52.3
			3/30	40	17.2	45.5	25.9	54.9
Stevens Pass Sand Shed	21B45	3700	3/13	23	9.5	27.2	10.3	37.5
			3/30	19	6.9	29.8	15.4	39.5

SKAGIT RIVER

Beaver Creek Trail	21A04	2200	3/28	0	0.0	8.9	3.6	15.4
Beaver Pass	21A01	3680	3/28	13	5.7	22.6	9.9	35.0
Brown Top Ridge +	21A28a	6000	3/28	101	39.0	47.2	30.4	74.2
Cloudy Pass +	20A22a	6500	4/1	98	34.3	-	22.8	49.8
Devils Park	20A04	5900	3/28	79	29.0	37.1	21.7	47.7
Freezeout Creek Trail	20A01	3500	3/28	0.8	0.3	9.8	4.8	13.7
Freezeout Meadows New	20A38	5000	3/28	48	17.6	23.7	16.0	41.0
Granite Creek	21A29A	3500	3/28	17	6.4	14.3	9.8	22.3
Harts Pass	20A05A	6500	3/28	83	30.6	39.6	22.0	48.5
Klesilkwa	3D03A-Can	3700	3/26	0	0.0	8.7	7.4	15.2*
Lightning Lake	3D02-Can	4000	3/30	17	5.9	10.6	5.5	14.4*
Lyman Lake	20A23A	5900	4/4	100	37.3	49.5	28.3	65.5
Meadow Cabins	20A08	1900	3/28	0	0.0	1.6	1.1	6.6
New Hozomeen Lake	21A30	2800	3/28	0	0.0	10.2	4.1	15.2
New Tashme	3D01A-Can	2500	4/1	0	0.0	6.7	4.8	10.9*
Rainy Pass	20A09	4780	3/28	64	23.1	33.0	22.8	43.7
Thunder Basin	20A07	4200	3/28	78	5.2	13.4	11.5	24.7

BAKER RIVER

Dock Butte	21A11A	3800		Late Report		47.0	34.2	74.5
Easy Pass	21A07A	5200		Late Report		58.0	39.2	88.7
Jasper Pass	21A06A	5400		Late Report		65.0	47.8	92.6
Marten Lake	21A09A	3600		Late Report		55.0	43.8	82.8
Mount Blum +	21A18a	5800		Late Report		50.0	35.1	65.9
Panorama New	21A26	4300	3/14	35	17.3	-	29.6	72.8
			3/28	41	16.3	-	37.3	77.0

Average based on 1963-77 average

* Average for years of record

+ Snow water equivalent estimated from aerial stadia observation

SNOW DATA TO APRIL 1, 1981 - APPENDIX 8

SNOW

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD		Avg. #
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)		
NAME	Number	Elevation				Last Year	1977	

BAKER RIVER (Cont.)

Rocky Creek	21A12A	2100			Late Report	6.0	15.6	34.4
Schreibers Meadow	21A10A	3400			Late Report	38.0	33.1	68.8
S. F. Thunder Creek	21A14A	2200			Late Report	6.0	3.1	7.9
Watson Lakes	21A08A	4500			Late Report	43.0	34.0	72.3

NOOKSACK RIVER

Bald Mountain +	21A19a	4400	4/1		Not Measured	45.8	29.8	60.0
Canyon +	21A20a	5100	4/1		Not Measured	54.2	45.3	73.9
Glacier Creek	21A23	3700	3/28	0	0.0	11.1	17.6	19.9
Panorama New	21A26	4300	3/14	35	17.3	-	29.6	72.8
			3/28	41	16.3	61.0	37.3	77.0
Twin Lakes +	21A21a	5200	4/1		Not Measured	58.6	45.3	84.4

O L Y M P I C P E N I N S U L ADUNGENESS RIVER

Deer Park	23B04	5200	3/31	19	6.4	15.7	12.6	22.9
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MORSE CREEK

Cox Valley	23B14	4500	3/30	34	11.0	28.5	22.2	44.3
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ELWHA RIVER

Hurricane	23B03	4500	3/30	12	2.8	10.7	14.1	26.9
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Agencies Assisting with Snow Surveys

GOVERNMENT AGENCIES

Canada:

Ministry of the Environment, Water
Investigations Branch, Victoria, British Columbia

States:

Washington State Department of Ecology
Washington State Department of Natural Resources

Federal:

Department of the Army
Corps of Engineers
U. S. Department of Agriculture
Forest Service
U. S. Department of Commerce
NOAA, National Weather Service
U. S. Department of the Interior
Bonneville Power Administration
Bureau of Reclamation
Geological Survey
National Park Service

PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company

OTHER PUBLIC AGENCIES

Okanogan Irrigation District
Wenatchee Heights Irrigation District

MUNICIPALITIES

City of Tacoma
City of Seattle

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

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